



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

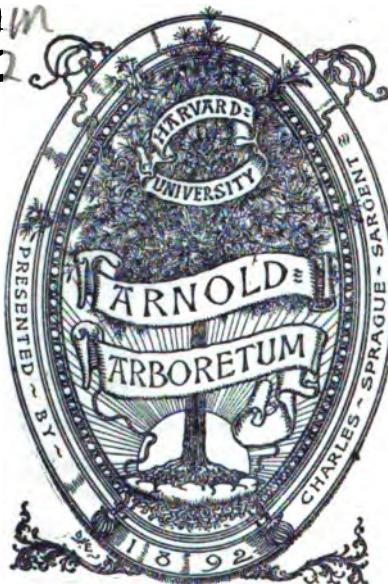
About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

Per A
Am

J.P.

Am
2







The American Botanist

Devoted to Economic and Ecological Botany



EDITED BY WILLARD N. CLUTE.

Volume X.



JOLIET, ILL.
WILLARD N. CLUTE & CO.
1906.

16-523

CONTENTS.

CONTRIBUTED ARTICLES.

A Fern Community.....	<i>Frank Dobbin,</i>	67
A New Blackberry From Vermont.	<i>W. H. Blanchard,</i>	69
A New Vermont Blackberry.....	<i>W. H. Blanchard,</i>	108
A Study of Years.....	<i>M. F. Bradshaw,</i>	84
A Vegetable Tramp.....	<i>W. Albion Squires,</i>	30
Botany for Beginners.....	8, 27, 48,	65
Buds	<i>Dr. W. W. Bailey,</i>	45
How to Begin Botany.....	<i>Willard N. Clute,</i>	89
Meadow Flowers.....	<i>Dr. W. W. Bailey,</i>	106
Naming the Ferns Without a Book.	<i>Willard N. Clute,</i>	101
Our Amentaceous Plants.....		61
Our Native Arums.....		31
Our Native Lilies.....		81
Our Orchids.....	<i>Dr. W. W. Bailey,</i>	4
Our Viburnums.....	<i>Dr. W. W. Bailey,</i>	62
The Chocolate Plant.....	<i>Dr. W. W. Bailey,</i>	87
The Choral Mushroom and Its Allies.....		21
The Giant Puffball.....		1
The Upas Tree.....	<i>Dr. W. W. Bailey,</i>	24

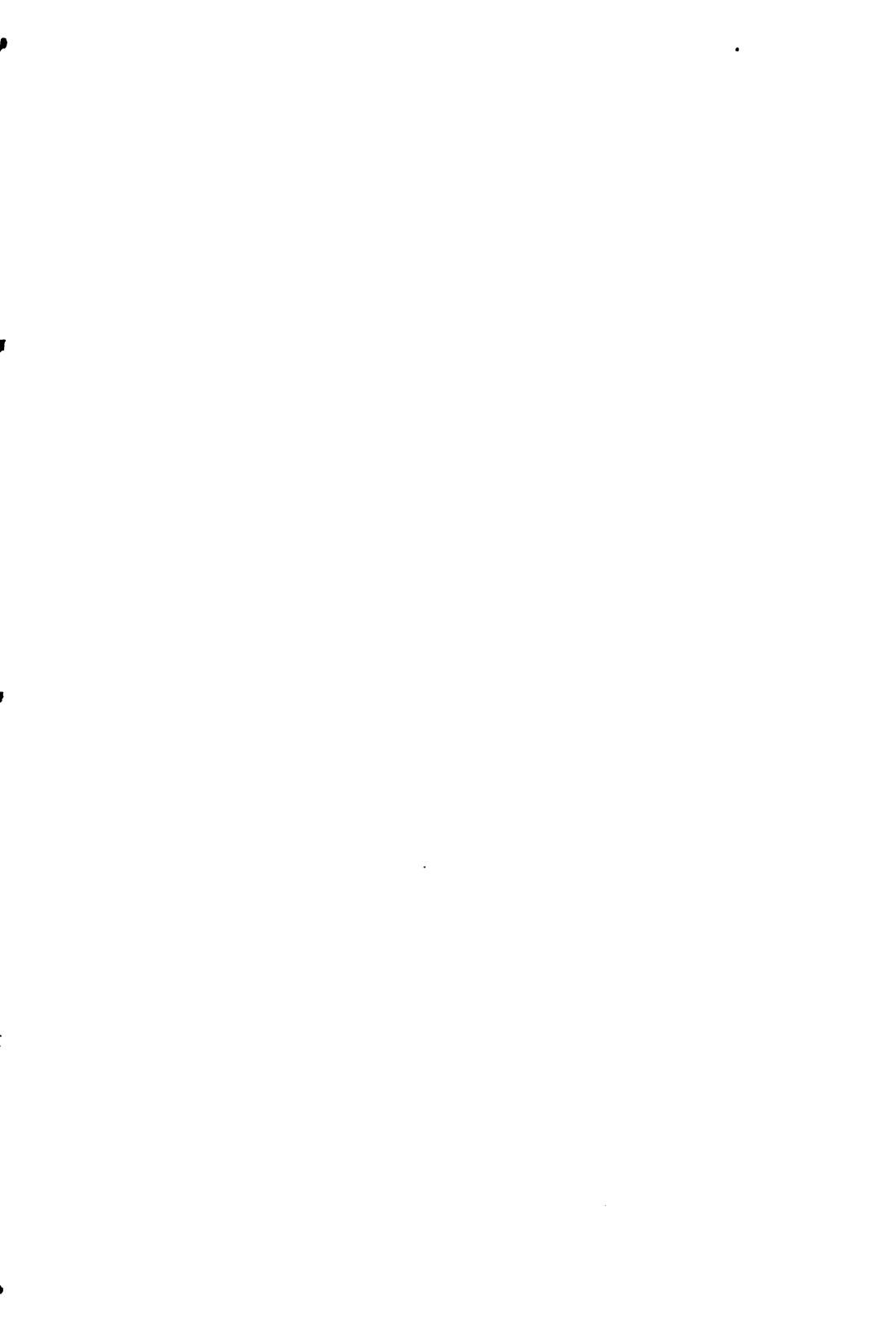
REPRINTED ARTICLES.

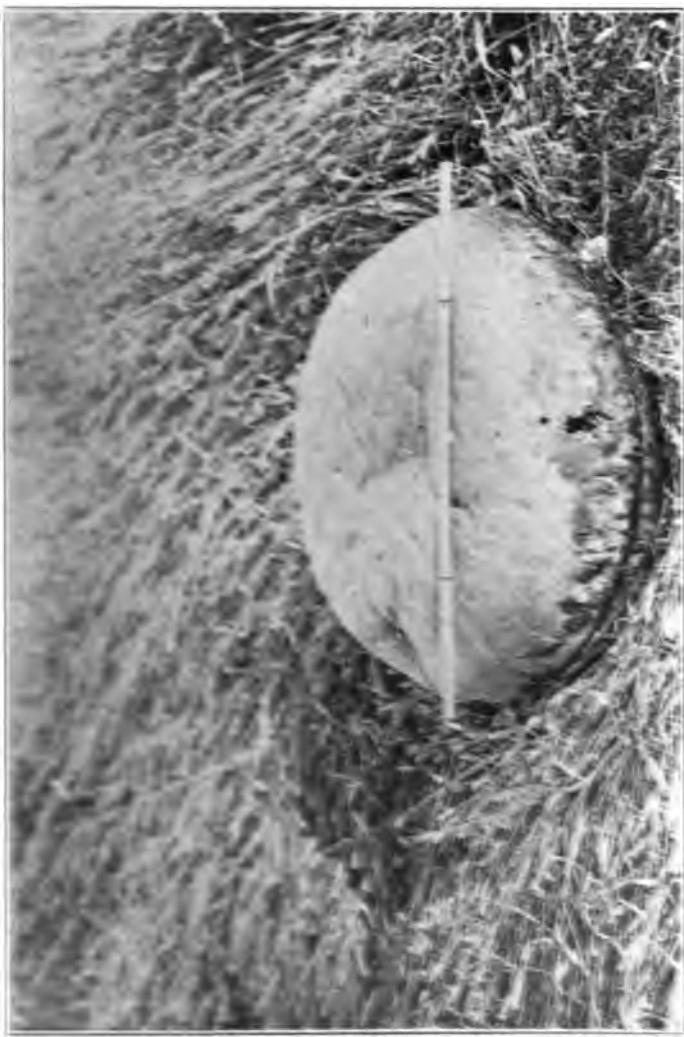
About Nutmegs.....	32
A Salad Fruit From the Tropics.....	111
Grape Fruit and Shaddock.....	52
Manna	110
Substitutes for Tea.....	13
Yerba Mate or Paraguay Tea.....	54

Editorial	18, 38, 58, 78, 98, 118
Books and Writers.....	20, 40, 80, 100, 119

NOTE AND COMMENT.

Arrow-leaf, Tubers of.....	36	Mulberry, The French.....	34
Bark, Use of.....	71	Mullein in the Rockies, The.	36
Bionomist, The.....	76	Mullein in the West, The...	16
Birds as Botanists.....	76	Mulleins, Western.....	73
Botany, Erroneous.....	75	New Species, Making.....	17
Catalpa, Vitality of.....	17	Odors of Flowers, Bees and the	73
Cold, Effects of on Plants.	77	Peppermint Oil.....	35
Color, Correlation of.....	16	Pine Forests..	15
Conifers, Seed Dispersal in.	57	Pipsissewa, Distribution of..	96
Conservatory, Origin of the Term	73	Plants, Effects of Cold on..	77
Edible Foliage Plants.....	115	Plants, Life Span of.....	95
Evening Primrose, Pedigree of	17	Pleasures of An Investigator, The	75
Ferns, Edible.....	71	Pollination, Style and Stigma in	117
Ferns, Viviparous.....	96	Schizaea, A New Station for	73
Flower, Definition of.....	116	Seed Dispersal in Conifers..	57
Flowers, Bees and the Odor of	73	Seeds and Light.....	36
Foliage Plants, Edible.....	115	Shallot	37
Fungi, Age of.....	34	Shrubs, Propagating.....	76
Fungi, Insects as Aids to....	114	Skunk's Cabbage, The.....	35
Galls, Insect.....	33	Soap Berries, Chinese.....	74
Ginkgo, Fertilization of....	94	Sphagnum and Lime.....	56
Hackberry for Shade, The..	15	Sugar from Trees.....	35
Herborizer, An Avian.....	74	Stray-Berry	34
Hops, A New Use for.....	64	Style and Stigma in Pollina- tion	117
Inspirations to Botanists....	115	Swamp-Plant Partnerships..	71
Interpretation of Species, The	117	Value of Common Objects..	94
Lacquer, Source of.....	70	Water-Cress Genus, The....	56
Lady Slipper, Habitat of..	97	Weeds, Introduced	96
Mandrake in Demand.....	100	Wizard of Horticulture, The	16
Maple, The Striped.....	116	Trees Tropical.....	56
Menthol	34	Yams	72
Mosquitos, Useful.....	94		





THE GIANT PUFFBALL.

THE AMERICAN BOTANIST

VOL. X.

JOLIET, ILL., JANUARY, 1906.

No. 1

THE GIANT PUFFBALL.

(*Calvatia Gigantea*.)

IN late autumn and early spring, when other objects of interest are scarce, the papery globes of various species of puffball are likely to attract the rambler's attention. Although often half hidden beneath the withered leaves, they do not long remain concealed, for the slightest touch is sufficient to cause them to send up a smoky cloud that makes their whereabouts known at once. Taken in hand, each specimen appears to be a more or less globular rind enclosing a brownish or purplish woolly mass that gives forth fresh clouds of smoke each time it is squeezed. Well might the superstitious and unbotanical countryman of the olden time call them devil's snuff boxes. In the present day, when a belief in the supernatural connections of plants no longer obtains, the objects are usually called smoke-balls or puffballs.

Although the mature puffball is a familiar sight to most frequenters of the country, there is an element of mystery surrounding its origin that many fail to fathom. The growing plant is so very unlike the ripe specimen that only the initiated are likely to discover the connection between them.

If we investigate the beginnings of the puffball we shall find that it is very much like that of the mushroom or any of the other conspicuous fungi. The greater part of the plant body is below the surface of the soil and consists of white, thread-like strands that ramify about in search of food.

Unlike the common plants, the puffballs have no chlorophyl or plant-green, and in consequence they are unable to

manufacture their own food. They are, therefore, obliged to live on food elaborated by other plants, and a decaying root or moldering log is quite to their taste. In such a medium the fungus strands luxuriate until the plant is ready to produce its spores. Then little whitish buttons or globes filled with closely packed cells begin to appear here and there on the threads and, finally, after a good soaking rain, the tiny cells quickly absorb the moisture and the young puffball expands and appears above the surface of the earth. It is still immature, however, and if broken open has the appearance of an unbaked loaf of bread, the interior being filled with a pure white, cheesy mass instead of the yellowish-brown spores. As the days pass the interior slowly changes in color, first to yellow and then to brown. Ultimately the outer skin breaks open and the multitudes of spores are ripe and ready to fly out in a smoke-like cloud at the slightest touch.

Botanists call the outer rind of the puffball the *peridium* and the cheesy mass within, the *gleba*. At maturity the gleba usually turns to a woolly mass in which the spores are entangled. Under a microscope this is seen to consist of fine elastic hairs, to which the name of *capillitium* has been given. The fungus threads that answer to the plant body form the *mycelium*.

There are about fifty species of puffballs in the United States, and any locality is likely to contain several different kinds. By far the largest of these is the giant puffball shown in our illustration. Ordinarily it is from eight to fifteen inches in diameter, but some truly gigantic specimens have been recorded. McIlvaine mentions one from the Eastern States that measured three feet in diameter and weighed forty-seven pounds. Specimens four feet in diameter are reported from Europe. Its specific name of *gigantea* is, therefore, well deserved; in fact, this is probably

the very largest fungus of any kind in the whole world. The specimen from which our plate was made was found in the Forest of Arden by Mr. H. C. Skeels and photographed by Prof. V. D. Hawkins. In the fresh state it measured twenty-three inches in diameter. At present it is deposited in the museum of the Joliet Township High School and is regarded as the largest museum specimen of this fungus in existence. Specimens as large as this are extremely rare, the usual size being seldom larger than a man's head.

Calvatia gigantea usually grows in grassy fields and is found in nearly all parts of the world. It is said to be especially abundant in New Zealand. Most mycologists regard it as rare in America, and C. G. Lloyd, one of our most prominent students of the fungi, says he has seen it growing but once. This does not agree with the writer's experience, however, for he has seen hundreds of specimens growing in certain grassy fields in Pennsylvania, and when a boy found amusement in knocking the soft white globes to pieces.

The greatest interest that attaches to the puffballs in the popular mind is no doubt due to their edible qualities. Among the mushrooms there are certain poisonous species which require great care to distinguish, but this is not true of the puffballs. Thus far not a single poisonous species has been reported. There is a curious passage in Creevey's "Recreations in Botany," in reference to puffballs, that is worth quoting. "The common puffball," she says, "deprives one who has eaten it of all power of motion, while his consciousness still remains, thus producing a sort of terrible trance, resembling death." This amazing statement is likely to amuse those mycophagists who are wont to dine on puff-balls almost daily while they are in season.

Some specimens are tougher than others, but all are edible, if collected while the inside is still pure white. The giant puffball is one of the tenderest of the group, and when

sliced and fried in butter makes a most palatable dish. It is likely that in time efforts will be made to grow this plant just as we now grow mushrooms.

Average specimens are commonly too large for a single meal, but if one uses care, enough for a meal may be sliced from the top and the remainder will remain in condition for a long time. Indeed, removing part of the puffball seems to delay the process of ripening. Thus does nature play into the hands of the cook. Somewhere in the account of his travels Marco Polo tells of an ox he saw from which steaks could be cut and new ones would grow to take their places. If he had said puffball instead of ox, his tale would have come nearer to the bounds of possibility.

In the days of flint and steel the contents of a ripe puffball made an excellent tinder for receiving the sparks struck from the flint. It has also been used as a sponge, a styptic and a dye-stuff. At present its only use is a culinary one. If used before the flesh shows the least trace of color, it is a most palatable and nourishing food, being not unlike beefsteak in composition.

OUR ORCHIDS.

BY DR. WM. W. BAILEY.

IN a very general way most people know about orchids. Much has been written about them in general popular literature and in costly illustrated scientific works only accessible in libraries. Travelers have, in their records, incidentally, much to say of them, and their observations are often of value.

For a long time now there has been a craze or fad for orchids that was never equaled in plant history except in the mad seeking for choice Dutch tulips in the late Middle Ages. Daring collectors are out all over the world ever

seeking new kinds. Upon those, fancy prices range easily into thousands of dollars for a single plant.

The most-sought exotics are nearly always air plants or epiphytes, as are also many gorgeous members of the pineapple family (*Bromeliaceae*). It is the practice of such plants to attach themselves to some other plant, or even inorganic support, from which they derive no nutriment whatever. They are nourished by the air, and possibly by whatever the peculiar spongy roots can obtain from rain or dew. In our finer hot-houses we see them hung in mid-air, attached to bits of cork or in wicker-work baskets, filled with sphagnum. The large pseudo-bulbs of these foreign species at once attract the visitors' attention, as do likewise the twine-like roots.

They are in no sense parasites; they commit no theft, only using neighboring plants for physical support; hence, they are of noble character. Parasitism is never commendable. All air plants are not, then, orchids. The writer often finds a misconception about this. Again, all orchids are not air plants; none of our native ones at the North are so.

What, then, constitutes an orchid? How is one to know them?

In the first place, they are monocotyledons or endogens, with parallel-veined leaves, one seed-leaf to the embryo, and stems of the general character of Indian corn, i. e., with no rings. They show also the characteristic numerical flower-plan of their class, the number six, though this is not carried out in full, as in a lily, or tulip, or iris.

In the orchids, one of the six perianth divisions differs essentially from the others, forming the labellum or lip. This is really the upper sepal, but by a twist of the ovary it is in most cases brought to the bottom of the flower. It may be merely fringed or ridged, or it may form a sac, or be hollowed into a bucket. It is frequently made attractive by

brilliant and even varied colors, when it serves, in part at least, as a convenient platform or landing place for a visiting insect on the wing. Sometimes this same sepal is projected backwards, as in the genus *Habenaria*, into a more or less elongated spur or nectary. This contains the fluid sought by insects and so essential to the process of cross-pollination.

The perianth or floral envelope, really the calyx and corolla fused together, coheres with the one-celled ovary, in which the numerous dust-like ovules are situated on the walls. The stamens, one or more, rarely two, in number, are consolidated with the style and stigma, forming the column. The pollen is not powdery, as in most other plants, but agglutinated, as in milk weeds, into pear-shaped bodies (pollinia), furnished at base with a stalk and an adhesive disk.

All the family show extraordinary processes for cross-pollination. This differentiation, for the accomplishment of special important ends, places them, in connection with the marked adnation and coalescence of parts, at the head of monocotyledons, or near it. They form a very large family, widely distributed, but of little direct economic importance. *Vanilla* is about the sole plant of the group that is made use of by man. It must be borne in mind, however, that, owing to the extreme beauty or singularity of the flowers, they are widely sought, and command extravagant prices. Among the most lovely of created objects, it suffices them to be such, so, with compositae, they have been placed among the "royal families" that neither toil nor spin. While the compositae are royal mendicants often, there is no orchid that is not evidently regal; even the common green ones wear a high, aristocratic look.

Of our orchids, the lady's slippers are perhaps the most familiar. The showy lady's slipper (*Cypripedium specta-*

bile) is one of our very finest wild flowers. It is pure white, except near the base of the slipper, where it is painted with rich purple. The yellow lady's slippers are nearly as choice, and much more common. The purple or stemless species is the most frequent of all. It grows in dry, sandy districts. In New Brunswick I have observed that it is quite as often white as colored. Is not albinism developed in many species as we go north?

Once upon a time, way back in 1866, the writer had the good fortune to find in New Brunswick two specimens of the rare and beautiful *Calypso borealis*. Years afterwards he celebrated the event in lines to "Calypso, a Rare Orchid of the North," in the New York *Evening Post*. The peculiar effect it had upon him, as something classic and mystical, is sung into that poem, which has often reappeared in orchid literature. To discourage the young from the hope of sustaining the vital spark by verse, the author will add that he never received a cent for it. Stick to prose, young friends, and of that be chary.

A very beautiful, and still rather common, orchid, which, as it is uprooted and sold in great bunches in our city streets, bids fair to ere long disappear, is the *Arethusa bulbosa*. Its leafless stem arises from a bulb, often immersed in peat moss. The solitary flower is of a deep magenta, with a lip fringed with gold and spotted with deep purple and white. It is odorless, and hence easily distinguished from *Pogonia ophioglossoides*, a pretty flower, paler in color, which very closely resembles it. This has a green leaf, too, half way up its stem. Another species of *Pogonia*, dark, livid purple and green in its colors, is found semi-occasionally in dense woods.

Calopogon pulchellus is a beauty, even in its beautiful family. It grows in peat bogs or damp places, and is of a deep, rich magenta, a color of which Nature is fonder than

man. It bears several flowers on a stem, each with an erect lip at the top of the flower. This goes to show that the ovary has not the usual twist of this family.

This article is already too long, or we might go on to enumerate and describe many other of our native plants, the fringed orchids, the maiden's tresses, the coral roots, etc. Mr. Weller's advice in letter-writing is, however, applicable to magazine articles as well. It is best to stop where the reader may demand more, or where one's feeling for the golden rule warns him to do as he would be done by.

Brown University, Providence, R. I.

BOTANY FOR BEGINNERS.—XXII.

ORDER 6—ARALES.

IN the older botanical works the palms and the arums were placed together in a division called the Spadiciflorae, in allusion to the spadix which characterizes many of them. But if we define a spadix as a fleshy spike of flowers, the palms would scarcely have a claim to being included. As a matter of fact, palms and arums are now placed in separate orders, but that they are closely related is shown by the structure of the flowering parts. Practically all of them have their flower-clusters surrounded by a large bract or spathe. It is interesting to glance back over the less highly organized orders of plant life and note the gradual rise of this bract. Among the grasses it is a mere green scale; in the palms it is often large and thick, but scarcely flower-like, while in the arum family it becomes thinner, of various bright colors and curious forms, and so petal-like that the whole flower-cluster, with its enclosing spathe, is often regarded as a single blossom. In reality, this kind of an arum "flower" is comparable with such a "flower" as the daisy, which consists of many small flowers in a head.

The representatives of the Araceae or *Arum* family within our limits are well known to botanists, because of the oddity of the flower-clusters, and when we survey the family as a whole we find that oddity is one of its strong characteristics. Most of the plants are herbs, but there are some shrubby species, and the stem forms range all the way from upright trunks and climbing vines to corms, tubers and rhizomes. These latter forms are well illustrated by such members of the family as the skunk's cabbage (*Symplocarpus*), Jack-in-the-pulpit (*Arisaema*), sweet flag (*Acorus*) and golden club (*Orontium*).

In the climbing species adventitious roots are usually produced and these may be of two kinds, one for clasping the support; the other for absorption. The absorbing roots generally grow downward until they reach the earth, but some species have roots with a spongy epidermis, which absorbs moisture from the air, like certain orchid roots.

The leaves, also, present great diversity of structure and range from long, narrow forms like those of the sweet flag to those of the Jack-in-the-pulpit, in which petiole and blade are sharply distinguished. In an Old World species of *Dracontium* the plant produces but one leaf a year, but this may become fifteen feet long. Curiously enough, although this is a monocotyledonous family, the leaves of most species are netted instead of parallel veined. In various species the leaves and rootstocks contain minute needle-like crystals that penetrate the mouth and throat when eaten and cause intense pain. The corm of the Jack-in-the-pulpit, called Indian turnip, is a familiar instance of this. These crystals are rendered harmless by heat or by drying. The Indian turnip is valued as a cough medicine when dried, and the roots of a tropical species of *Colocasia*, or taro, form the chief food supply of a large number of people.

The typical arum flower-cluster might be described as a fleshy spike, upon which the flowers are closely sessile, the whole surrounded or subtended by a bract or spathe. Often the bract is green, but it may be white, yellow, scarlet or other colors. Frequently it encloses both flowers and spadix, as in the skunk's cabbage; occasionally the tip of the spadix projects beyond it, as in the green dragon (*Arisaema dracontium*); again, it may be so inconspicuous as to seem absent, as in the golden club; while in the sweet flag it is so blended with the scape as to appear like an ordinary leaf. In an African species the spathe may reach a length of six feet.

The flowers, in keeping with the family's reputation for oddity, differ in many ways from the type. They are usually three-parted, as monocotyledon flowers should be, but some are two-parted. Some consist only of stamens and pistils, while others have a distinct perianth. In some, pistils and stamens are borne in the same flower; in others, pistillate and staminate flowers are in separate regions on the same spadix; and in still others, pistillate and staminate flowers are on separate plants. A single species often shows many gradations between these extremes, as for example, the Jack-in-the-pulpit, in which one may find all forms from strictly pistillate to completely staminate flowers, the best-nourished plants being invariably pistillate.

In this group the pistils ripen before the stamens and the flowers of necessity are pollinated by insects. This is also indicated by the colored spathes and spadixes and the strong odors various species emit. The fruit is usually a berry, bright in color when ripe, and in some cases edible. The well-known ceriman (*Monstera deliciosa*) is the ripened fruit of a climbing species common in cultivation.

Most of the arums are plants of the marshes and wet woodlands, and one species, *Pistia stratiotes*, the water cab-

bage of the tropics, is normally floating. There are more than a hundred genera and nearly a thousand species belonging to the group. They are widely spread throughout the earth, but most numerous in warm regions. It is estimated that 90 per cent of the species are to be found in the tropics. The Old World contains the greatest number of species, and it is noticeable that while the family is represented in both hemispheres the different genera are usually confined to a single continent. There are twenty-seven genera in the division of the family to which our green dragon belongs, and fifty species in its genus. *Phelodendron*, a tropical genus, has a hundred species. From this genus a large number of the climbing species come. In the genus *Anthurium* there are two hundred species. The genus *Acorus*, to which our sweet flag belongs, has but two species, one in Japan and the other widely spread in the north temperate zone. Our species is peculiar for seldom producing good seeds. As in other plants that spread readily by underground parts, the production of seed seems to be neglected.

One would scarcely think of putting the little duck-meats (*Lemnaceae*), so abundant on the surface of all still waters, in the same family with the arums, and yet there is where they undoubtedly belong. According to Rendle, they are smallest and least differentiated of seed plants. We can scarcely consider the plant body as consisting of distinct stem and leaves, but if we call the rounded outgrowths leaves, the stem in some species is about one twentieth of an inch long. In temperate regions the plants seldom flower, forming vegetative shoots instead. The flowers are very rudimentary, the staminate flower consisting of two stamens and the pistillate one of a single pistil. Of course such diminutive flowers are self-pollinated. At the base of the staminate flower there is a scale-

like outgrowth which is regarded as a rudimentary spathe. There are but three genera and nineteen species of this group in the world, but they are spread in all waters, except those of the frigid zone. In our own region they grow so abundantly as to completely cover the surface of many ponds.

A MOUNTAIN MEADOW IN CALIFORNIA.

BY MARIETTE POWERS BENTON.

NEVER shall I forget the joy and surprise when one day as we were following a mountain trail it suddenly opened up into a little mountain meadow or cienaga, as the Spanish call it. We had been long absent, as it seemed to us, from our beloved New England meadows. But here, four thousand, three hundred feet above sea level, in the heart of the California mountains, were many of our old-time favorites. Golden-rod! Not once during our exile in this land of flowers (Southern California) had we seen a single plant. Here they were, recalling to our hungry mind the golden splendor of many a vanished autumn. Cardinal flower (*Lobelia splendens*), not a few plants only, but hundreds of large, dark red sprays. So vivid were they that we shut our eyes and opened them again to see if we were dreaming or awake. And, yes, there was one spray pure white. Columbine nodded and danced its cups upon the banks of the little brook. True, they seemed somewhat out of season, blooming beside golden-rod and cardinal flower, but they were none the less welcome. Elder berries shook their tempting bunches of purple fruit above our heads, while clinging to and climbing over everything was wild clematis, that roadside favorite of the Eastern States. But most pleasing of all were the evening primroses (*Oenothera grandiflora*). Many of them yet lingered into the sunshine,

wide open, and fully three inches in diameter. Of course, we could not be content with one visit and so one moonlight night we wandered down to the little meadow again. It seemed like fairyland. Thousands of these evening primroses were swaying in the breeze, many of the stalks as tall as our heads. Almost, we felt we were home once more, but, alas, our eyes wandered to the surrounding hills. They, at least, were truly Californian, showing clearly the sage brush and dried yucca stalks, which in the moonlight seemed like an army of giant ghosts. To the traveler far from home it was a heartsome spot, and we could not see the strange flowers so happy were we with the familiar ones. Southern California, it is true, is a garden of flowers after the rainy season, but to the "Easterner" they are all strange and new, and one has to get acquainted before he can feel at home. So this little mountain meadow, filled with the flowers we had not seen for many moons, gave us more pleasure than the thousands of new strange flowers we had studied and puzzled over in our adopted state.

Riverside, California.

SUBSTITUTES FOR TEA.

TEA, or an infusion of it, is an aromatic drink, more or less astringent and stimulant. It aids the digestion and quickens the circulation by acting on the nervous system and the intellectual faculties. Now other plants have exactly the same qualities as the Chinese tea, but they have the great fault of being much cheaper. Every infusion of a plant that has the same properties as tea will have the same effects; thus the word "tea" has come to signify, in a general way, "digestive beverage," and we shall see that several plants may replace the real tea. One of them has

already won a considerable place as a digestive drink, so much so that instead of "afternoon tea," we may some day have our "afternoon camomile." Everyone knows the camomile and its properties; it is tonic and stimulant, and one soon becomes accustomed to its slightly bitter taste. It is a French flowering plant, *Anthemis nobilis*, and the variety most cultivated is that with double flowers, which is more active than the wild single-flowered type.

What is called "European tea" is furnished by the officinal veronica (*Veronica officinalis*), of very aromatic bitter taste, whose flowering heads are used, fresh or dried, in the proportion of thirty grams to a liter of water [about an ounce to a quart]. "French tea" or "Greek tea" is a plant of Southern France, the officinal sage (*Salvia officinalis*), of strong and agreeable aromatic odor, whose flowering heads and leaves have a pronounced taste, hot and a trifle piquant; its properties are tonic, stimulant, and cordial.

The "Mexican" or "Jesuits'" tea is the product of the ambrosia (*Chenopodium ambrosioides*), a species of "goosefoot" or "pigweed," an aromatic plant, a native of Mexico, whose flowers and seeds have stimulant properties. "Oswego" or "Pennsylvania" tea comes from a horsemint (*Monarda didyma*), a beautiful plant of American origin, often cultivated in gardens for its beautiful scarlet flowers. Its leaves yield an agreeable tea.

The "Canada" or "mountain" tea, called also "read tea," is the product of the common wintergreen (*Gaultheria procumbens*), whose perfumed leaves are used for this purpose.

The author goes on to cite a considerable number of other shrubs whose leaves and flowers may be used to make a substitute for tea. Among these the only familiar ones are the Paraguay tea (*Ilex paraguayensis*), so largely used

in South America, and the "false tea" (*Lantana pseudothea*), employed in Brazil.

It may be seen that there is great choice of plants that may be used for tea; every country has found its own, so to speak, by looking among the weeds that spring up in its own fields. The digestive and stimulant qualities of these teas of course vary with the species, and it is proper to select those that possess them in the highest degree. We incline to believe that the Roman camomile holds first place, but it is easy to try a large number of other teas whose plants may be found in the gardens, for here we must not discuss tastes, and each plant has its own peculiar flavor.—*From an article in American Grocer.*



Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

PINE FORESTS.—In Step's "Wayside and Woodland Trees" we are told that there can be no such thing as a pine forest, for the old German word *forst*, from which our word forest is derived, means pine. A forest, then, is properly an assemblage of pine trees.

THE HACKBERRY FOR SHADE.—The editor of *Arboriculture* recommends the hackberry (*Celtis occidentalis*) as a shade tree. It is a clean tree, free from insects and produces an abundance of berries much liked by the birds.

The foliage is so elm-like that people who go to the woods for their shade trees often dig up the hackberry for the elm by mistake. In the East the hackberry appears seldom to attain great size, but in the Middle West trees eighteen inches or more in diameter are common.

THE WIZARD OF HORTICULTURE.—This magazine does not usually publish poetry, even if paid for at advertising rates, but so many astounding things have been claimed for Burbank in the daily press, that we are tempted to quote the following from *Gardening*:

O, Mr. Burbank, won't you try to do some things for me?
A wizard clever as you are can do them easily.
A man who turns a cactus plant into a feather-bed
Should have no trouble putting brains into a cabbage head.

CORRELATION OF COLOR.—It is a curious result of the correlation of color that red flowers should almost invariably have black seeds. Thus when one is planting mixed seeds of a garden variety having flowers of more than one color, he may select out the red-flowered sorts by the color of their seeds. Black seeds themselves have the red coloring, anthocyan.

THE MULLEIN IN THE WEST.—In the October Note and Comment I saw a note in regard to mullein in the West. I have never seen the plant in Southern California, but on a recent trip through the old mining region about Placerville I observed it frequently. I noticed occasional plants by the roadside, but its favorite place of growth seemed to be hillside clearings in the pine forest, especially where brush had been burned recently. The plants were of medium height, and did not seem to mind the prolonged summer drought in the least. I did not notice any plants below fifteen hundred feet elevation, but above that they seem to be slowly spreading. As near as I could learn from old

residents they have been introduced for a long time, probably ever since '49.—*W. Scott Lewis, Los Angeles, Cal.*

PEDIGREE OF THE EVENING PRIMROSE.—The evening primrose (*Oenothera*) may not belong to the most aristocratic of floral families, but, owing to its usefulness in exemplifying the mutation theory of the origin of species, the pedigree of certain specimens may be traced back for a greater distance than that of other flowers. Some have a known pedigree extending back for twenty years, at least ten generations.

MAKING NEW SPECIES.—It has been found by Dr. D. T. MacDougal that the injection of various substances into the ovary of certain plants will cause the seed in the resulting capsule to produce plants unlike the parent in one or more respects. It may therefore be questioned whether the "sports" that sometimes occur among large numbers of seedlings may not be due to some injury to the ovary while the seed was forming. If the character of the plant can be influenced by stimulation of the ovary, some wonderful possibilities seem within our grasp.

VITALITY OF CATALPA.—In the January number of *Arboriculture* there is a photograph of a long line of catalpa trees that have originated from fence posts. The posts were set with the bark on and immediately sprouted. At present the sprouts are much larger than the original posts. The same magazine is authority for the statement that such sprouting is a common occurrence with this species. Hitching posts, props, and the posts under the foundations of houses when made of this wood are likely to produce new trees. One may thus grow two new fence posts while the original is wearing out, a unique idea in forestry.

The foliage is so elm-like that people who go to the woods for their shade trees often dig up the hackberry for the elm by mistake. In the East the hackberry appears seldom to attain great size, but in the Middle West trees eighteen inches or more in diameter are common.

THE WIZARD OF HORTICULTURE.—This magazine does not usually publish poetry, even if paid for at advertising rates, but so many astounding things have been claimed for Burbank in the daily press, that we are tempted to quote the following from *Gardening*:

O, Mr. Burbank, won't you try to do some things for me?
A wizard clever as you are can do them easily.
A man who turns a cactus plant into a feather-bed
Should have no trouble putting brains into a cabbage head.

CORRELATION OF COLOR.—It is a curious result of the correlation of color that red flowers should almost invariably have black seeds. Thus when one is planting mixed seeds of a garden variety having flowers of more than one color, he may select out the red-flowered sorts by the color of their seeds. Black seeds themselves have the red coloring, anthocyan.

THE MULLEIN IN THE WEST.—In the October Note and Comment I saw a note in regard to mullein in the West. I have never seen the plant in Southern California, but on a recent trip through the old mining region about Placerville I observed it frequently. I noticed occasional plants by the roadside, but its favorite place of growth seemed to be hillside clearings in the pine forest, especially where brush had been burned recently. The plants were of medium height, and did not seem to suffer much from summer drought in the least. I did not see any above low fifteen hundred feet elevation, and they seemed to be slowly spreading. As nearly as I can judge, the plant is not common in the West.

residents they have been introduced for a long time, probably ever since '49.—*W. Scott Lewis, Los Angeles, Cal.*

PEDIGREE OF THE EVENING PRIMROSE.—The evening primrose (*Oenothera*) may not belong to the most aristocratic of floral families, but, owing to its usefulness in exemplifying the mutation theory of the origin of species, the pedigree of certain specimens may be traced back for a greater distance than that of other flowers. Some have a known pedigree, extending back for twenty years, at least ten generations.

MAKING NEW SPECIES.—It has been found by Dr. D. T. MacDougal that the injection of various substances into the ovary of certain plants will cause the seed in the resulting capsule to produce plants unlike the parent in one or more respects. It may therefore be questioned whether the "sports" that sometimes occur among large numbers of seedlings may not be due to some injury to the ovary while the seed was forming. If the character of the plant can be influenced by stimulation of the ovary, some wonderful possibilities seem within our grasp.

VITALITY OF CATALPA.—In the January number of *Arboriculture* there is a photograph of a long line of catalpa trees that have originated from fence posts. The posts were set with the bark on and immediately sprouted. At present the sprouts are much larger than the original posts. The same magazine is authority for the statement that such

Hitchin
as a common occurrence with this species.
ts under the foundations
l are likely to produce
new fence posts while
idea in forestry.

The foliage is so elm-like that people who go to the woods for their shade trees often dig up the hackberry for the elm by mistake. In the East the hackberry appears seldom to attain great size, but in the Middle West trees eighteen inches or more in diameter are common.

THE WIZARD OF HORTICULTURE.—This magazine does not usually publish poetry, even if paid for at advertising rates, but so many astounding things have been claimed for Burbank in the daily press, that we are tempted to quote the following from *Gardening*:

O, Mr. Burbank, won't you try to do some things for me?
A wizard clever as you are can do them easily.
A man who turns a cactus plant into a feather-bed
Should have no trouble putting brains into a cabbage head.

CORRELATION OF COLOR.—It is a curious result of the correlation of color that red flowers should almost invariably have black seeds. Thus when one is planting mixed seeds of a garden variety having flowers of more than one color, he may select out the red-flowered sorts by the color of their seeds. Black seeds themselves have the red coloring, anthocyan.

THE MULLEIN IN THE WEST.—In the October Note and Comment I saw a note in regard to mullein in the West. I have never seen the plant in Southern California, but on a recent trip through the old mining region about Placerville I observed it frequently. I noticed occasional plants by the roadside, but its favorite place of growth seemed to be hillside clearings in the pine forest, especially where brush had been burned recently. The plants were of medium height, and did not seem to mind the prolonged summer drought in the least. I did not notice any plants below fifteen hundred feet elevation, but above that they seem to be slowly spreading. As near as I could learn from old

residents they have been introduced for a long time, probably ever since '49.—*W. Scott Lewis, Los Angeles, Cal.*

PEDIGREE OF THE EVENING PRIMROSE.—The evening primrose (*Oenothera*) may not belong to the most aristocratic of floral families, but, owing to its usefulness in exemplifying the mutation theory of the origin of species, the pedigree of certain specimens may be traced back for a greater distance than that of other flowers. Some have a known pedigree extending back for twenty years, at least ten generations.

MAKING NEW SPECIES.—It has been found by Dr. D. T. MacDougal that the injection of various substances into the ovary of certain plants will cause the seed in the resulting capsule to produce plants unlike the parent in one or more respects. It may therefore be questioned whether the "sports" that sometimes occur among large numbers of seedlings may not be due to some injury to the ovary while the seed was forming. If the character of the plant can be influenced by stimulation of the ovary, some wonderful possibilities seem within our grasp.

VITALITY OF CATALPA.—In the January number of *Arboriculture* there is a photograph of a long line of catalpa trees that have originated from fence posts. The posts were set with the bark on and immediately sprouted. At present the sprouts are much larger than the original posts. The same magazine is authority for the statement that such sprouting is a common occurrence with this species. Hitching posts, props, and the posts under the foundations of houses when made of this wood are likely to produce new trees. One may thus grow two new fence posts while the original is wearing out, a unique idea in forestry.

The foliage is so elm-like that people who go to the woods for their shade trees often dig up the hackberry for the elm by mistake. In the East the hackberry appears seldom to attain great size, but in the Middle West trees eighteen inches or more in diameter are common.

THE WIZARD OF HORTICULTURE.—This magazine does not usually publish poetry, even if paid for at advertising rates, but so many astounding things have been claimed for Burbank in the daily press, that we are tempted to quote the following from *Gardening*:

O, Mr. Burbank, won't you try to do some things for me?
A wizard clever as you are can do them easily.
A man who turns a cactus plant into a feather-bed
Should have no trouble putting brains into a cabbage head.

CORRELATION OF COLOR.—It is a curious result of the correlation of color that red flowers should almost invariably have black seeds. Thus when one is planting mixed seeds of a garden variety having flowers of more than one color, he may select out the red-flowered sorts by the color of their seeds. Black seeds themselves have the red coloring, anthocyan.

THE MULLEIN IN THE WEST.—In the October Note and Comment I saw a note in regard to mullein in the West. I have never seen the plant in Southern California, but on a recent trip through the old mining region about Placerville I observed it frequently. I noticed occasional plants by the roadside, but its favorite place of growth seemed to be hillside clearings in the pine forest, especially where brush had been burned recently. The plants were of medium height, and did not seem to mind the prolonged summer drought in the least. I did not notice any plants below fifteen hundred feet elevation, but above that they seem to be slowly spreading. As near as I could learn from old

residents they have been introduced for a long time, probably ever since '49.—*W. Scott Lewis, Los Angeles, Cal.*

PEDIGREE OF THE EVENING PRIMROSE.—The evening primrose (*Oenothera*) may not belong to the most aristocratic of floral families, but, owing to its usefulness in exemplifying the mutation theory of the origin of species, the pedigree of certain specimens may be traced back for a greater distance than that of other flowers. Some have a known pedigree, extending back for twenty years, at least ten generations.

MAKING NEW SPECIES.—It has been found by Dr. D. T. MacDougal that the injection of various substances into the ovary of certain plants will cause the seed in the resulting capsule to produce plants unlike the parent in one or more respects. It may therefore be questioned whether the "sports" that sometimes occur among large numbers of seedlings may not be due to some injury to the ovary while the seed was forming. If the character of the plant can be influenced by stimulation of the ovary, some wonderful possibilities seem within our grasp.

VITALITY OF CATALPA.—In the January number of *Arboriculture* there is a photograph of a long line of catalpa trees that have originated from fence posts. The posts were set with the bark on and immediately sprouted. At present the sprouts are much larger than the original posts. The same magazine is authority for the statement that such sprouting is a common occurrence with this species. Hitching posts, props, and the posts under the foundations of houses when made of this wood are likely to produce new trees. One may thus grow two new fence posts while the original is wearing out, a unique idea in forestry.

Editorial.

Shortly after the October number of this magazine was issued, the printer with whom we have a contract for the work decided to move his establishment to Ashland, Maine, where the numbers for the remainder of 1905 will be printed. As we write, the November issue is in type and the December number will follow immediately. It is not our intention, however, to wait for the completion of these numbers to begin Volume X. We have selected another printing house and this initial number will appear on time. All our present subscribers will receive the numbers to complete the preceding volume, whether they continue as subscribers or not, but we trust that none will fail to renew. The amount of ill luck that has attended our attempt to issue a well-printed magazine on time would be amusing if it were not so serious a matter to subscribers. We take pleasure in noting, however, that during the publishing of the nine preceding volumes, subscribers have received more than we agreed to give, and that we have not attempted to economize, even when the numbers were late, by issuing two numbers in one. This record, we trust, will merit a renewal of your subscription.

* * *

With this issue we send out bills for 1906 with arrears, if any, added. The magazine is sent until ordered discontinued, and, if any do not wish to subscribe for this year, we should be notified at once. Thus far we have found very few who have discontinued after once subscribing. The contents of the magazine attract a substantial, thoughtful class of readers who do not change from one thing to another without good cause. All such will

be glad to know that the magazine for 1906 will follow the usual standard. The articles on the flowering plant families will be continued, a frontispiece will appear in each issue, and the Note and Comment department will remain an important feature. We solicit a continuance of contributed notes and longer articles from our readers.

* * *

Look over your files and if any numbers are missing later than Volume VII we shall be glad to supply them free. We can no longer make this offer for the earlier volumes, because recent orders have so reduced our stock that no single numbers are available. If any reader of this magazine has not a full set of the back numbers, he will later regret that he did not secure them while he could. A large proportion of our new subscribers order full sets from the beginning. This is especially true of libraries. If you do not care to own a full set, ask the nearest library to order one, so that you can refer to it when desired. When our stock is gone it will be too late.

* * *

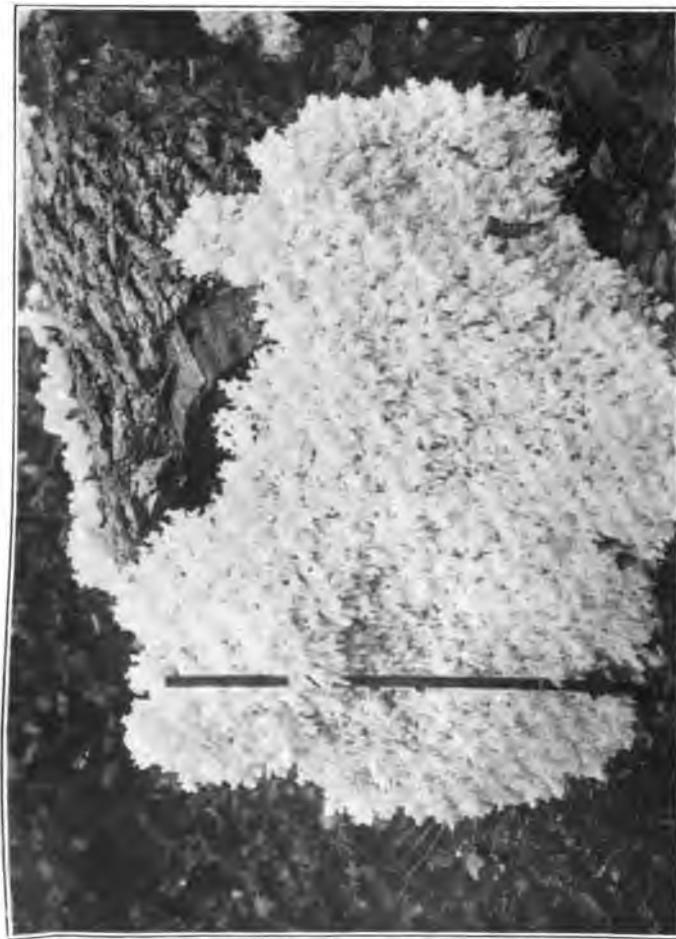
Last autumn *The Garden Magazine* announced that it would soon give a gold medal to the cultivator who first showed that it was possible to grow fringed gentians from seed. Upon receipt of this notice we at once claimed the prize for Mr. J. Ford Sempers, of Aikin, Md., who raised the plants from seed five years ago, and whose observations on their germination and growth have appeared at various times in the AMERICAN BOTANIST. In spite of this, the prize went to Mr. Thomas Murray, of Tuxedo Park, N. Y., whose experiments did not begin until a year later than Mr. Sempers', and whose published results did not appear until December, 1905. In fact, the successful work of Mr. Murray was not begun, as appears from his account, until

1903. The pretext for ruling out Mr. Sempers' claims was that he had not published full cultural directions. It is noticeable, however, that at the time Mr. Murray was awarded the medal he had published no cultural directions whatever. The whole medal performance, therefore, has the semblance of a magazine presenting bouquets to itself merely for advertising effect. The medal is inscribed, "For raising fringed gentians from seed." Nothing was said about cultural directions until our candidate appeared. If *The Garden Magazine* has any more medals to give away we venture that the editor will look carefully through the files of AMERICAN BOTANIST before committing himself.

BOOKS AND WRITERS.

After Dr. J. M. Coulter's "Plant Relations" and "Plant Structures" had been issued, the two were combined in abridged form to make a volume called "Plant Studies." This latter volume, worked over and rearranged, has now appeared as "A Text-book of Botany." The book begins with a study of leaves and runs on through stems and roots to the germination of seeds. Then begin studies of typical plants, to illustrate the principal plant groups, and the book ends with chapters on plant breeding, forestry and plant societies. In the opinion of the reviewer the latter half of the book is by far the better. The work, however, is very well done and the book is likely to retain the place its predecessor made in the estimation of teachers of botany. There is an abundance of good illustrations that help greatly in elucidating the text. (New York, D. Appleton & Co., 1906.)





THE CORAL MUSHROOM—*Hydnangium Coralloides*.

THE AMERICAN BOTANIST

VOL. X.

JOLIET, ILL., FEBRUARY, 1906.

No. 2

THE CORAL MUSHROOM AND ITS ALLIES.

THE forms that are comprised in the great group of the Fungi are so numerous as to species and so varied as to form that none but the scientist dares to set the bounds of the mushroom family. Popularly, of course, there is but one mushroom—*the* mushroom—and all the rest are toadstools; but the scientist would not agree with this definition. He claims that there are more than a thousand species of mushrooms in America, alone, and several times as many more in the rest of the world. We commonly think of the mushrooms and toadstools as little umbrella-shaped growths of various colors, but here again the scientist disagrees with us and claims many apparently incongruous forms as relatives of the family.

We may, perhaps, gain a better perspective of some of the closely related families of the higher fungi if we reflect that what may be called the true mushrooms—the *Agaricaceae*—bear their spores on the surface of thin plates that hang downward from the umbrella-like top of the fruiting portion. In the *Boletaceae* these plates are replaced by a cushion-like growth, made up of numerous small tubes, on the inner surface of which the spores are borne. The members of the *Polyporaceae* have a similar cushion of spore-bearing tubes, but are distinguished from the *Boletaceae* by being usually hard and woody, and by the tube-bearing portion not readily separating from the cap that bears it. In the *Clavariaceae* the spore-bearing layer is confined to the upper parts of erect branching masses, like the antlers of miniature deer. The *Hydnaceae*, to which the subject of our sketch belongs, seems at first glance to partake of the characters of all

the others. Some species have a circular cap and central stem, like a well-ordered member of the Agaricaceae, others might be mistaken for species of *Boletus* or *Polyporus*, while still others might be confused with the Clavariaceae. The key to this identification, however, is found in the fact that no matter what their shape, their spores are borne on tooth-like projections that invariably point downward from their place of origin.

Like all their relatives the members of the genus *Hydnium* are saprophytes, living on the dead and decaying bodies of other plants. A spore happening to alight upon a decaying log or dead tree may give rise to a tangle of fungus threads that in time will penetrate to the farthest cells and send up, season after season, from every available point, the fruiting parts. In the present instance the fruiting parts consist of great quantities of creamy-white fruiting branches whose delicate beauty has few equals in nature. It is said that Elias Fries, one of the fathers of mycology, was first attracted to the study of the fungi by the sight of this beautiful plant in the Swedish forests.

Though the group to which our species belongs is often called the prickly fungi and hedgehog fungi, the name of coral fungus or coral mushroom is so appropriate for the plant shown that it persists in spite of the fact that, as we have shown, it is not a mushroom. Its scientific name, too—*Hydnium coralloides*—hints at its form; in fact, so much does it resemble coral that the reader will be likely to identify it without a book, when he next finds it. Pushing out from some convenient crevice in the log upon which it is growing, the growth branches and branches again until it ends in slender twigs, which are thickly set with round, awl-shaped spines, all of which point downward. This latter feature, alone, is sufficient to distinguish it from the various species of *Clavaria* which sometimes grow near it. It is said to

grow from six to eight inches across, and this, indeed, is the average size, but the two-foot rule in our illustration shows that the specimen from which the photograph was made was quite four feet across. The plant grows upon standing or fallen timber, and when growing upon dead trees often decorates them from base to summit with cluster after cluster of the beautiful sprays. It exhibits great latitude in the choice of a log upon which to grow and has been found upon fir, oak, ash, birch, hickory, maple and beech. It is said to be most common on beech, but the illustration is from a specimen growing on maple. For at least ten months in the year, one might pass the log in which it was growing without being aware of its presence. Not until the September rains come do the fruiting parts appear, and as soon as the spores are shed they shrivel.

The bear's head *Hydnnum* (*H. caput-ursi*), is said to be more common than the coral mushroom, but we have not found it so. In this latter species the spines are longer, often reaching the length of an inch, and are inclined to be assembled in groups at the ends of the short branches. It apparently never grows as large as *H. coralloides*, though the Lloyd Museum has a specimen that must have been twenty inches in diameter. The Medusa's head *Hydnnum* (*H. caput Medusae*), scarcely branches. It has longer spines than the preceding, and the upper ones are inclined to twist about in imitation of the snaky locks of the mythological personage for whom the plant is named. This species is not common, but if found may be further distinguished from *H. caput-ursi* by the fact that it turns to ash color in drying, instead of becoming brown. The Satyr's beard (*H. erinaceum*) is another species that is not uncommon. In this the spines often reach a length of four inches.

All the species here mentioned are harmless, mild, tender and edible. Some of them have a slightly acrid or bitter

taste, which may be removed by parboiling for a few minutes. They may then be stewed with milk or treated as other edible fungi are. When one is fortunate enough to find it in quantity, it may be made the base of many palatable meals. The specimen illustrated was found in the Forest of Arden two years ago, by Mr. H. C. Skeels. During the winter a section of the log was removed to a shady place near his home, and last autumn bore such an abundant crop that all his acquaintances dined upon it frequently. Nearly a hundred pounds of edible fungus was removed from this section. Our photograph is made from the section left in the forest. When the spores ripened an effort was made to plant it on other logs by inserting spores in the most likely places. Whether this was successful or not remains for another season to tell. Our photograph was made by Prof. V. D. Hawkins.

THE UPAS TREE.

(*Antiaris Toxicaria.*)

DR. WM. WHITMAN BAILEY.

THREE is no more famous plant in the world than the upas tree of Java. It is made to point a moral and adorn a tale. All sorts of dreadful stories have been told about it, till "the deadly upas" has become a by-word and a figure of speech. Most of these legends are, however, grossly exaggerated. The tree *Antiaris* is certainly poisonous to a degree, and many persons have been dangerously affected by climbing after its flowers or fruit. Still, we must totally discredit the more romantic and thrilling tales. They will do to take place beside the story of the arboreous, man-eating *Drosera*, famous some thirty years ago. Where a thing is not inherently impossible, it is easy to build up an agreeable

and widely accepted anecdote. One plant, then, may be, like upas, extremely poisonous; another, like *Drosera*, small, but an expert fly-trap. All that is necessary to create a legend is to intensify the poison in the one case and magnify the plant and its prey in the other.

The entrancing and misleading tales of upas, it seems, were first circulated by a Dutch surgeon, about the close of the last century. This account, which has been constantly repeated and embellished during all these years, represents the tree as growing in a desert region a long distance removed from any other plant. Condemned criminals and political offenders were offered a chance for life if they would venture to visit the tree and collect some of its poison. In the case of a ward boss or county politician this might appear to be a case of Newcastle seeking coals—or Rhode Island, clams! Be that as it may, the victim was safe-guarded as far as possible by reputed antidotes and nostrums, charms, and talismans, but it is said that only two out of every twenty returned alive!

A graphic account was always added to the picture of the ground about the tree strewn with the bleaching bones of the unfortunate victims—

“The bodies and the bones of those
That strove in other days to pass
Are withered in the thorny close,
Or scattered bleaching on the grass.”

The aforesaid Dutch surgeon, whose name was Foresch, states that “there are no fish in the neighboring waters, nor has any rat, mouse, or any other vermin been seen there; and when any birds fly so near this tree that the effluvia reaches them, they fall, a sacrifice to the effects of the poison.” He proceeds even to draw a longer bow by asserting that “out of a population of 1,600 persons who were compelled, on account of civil dissensions, to reside within

twelve or fourteen miles of the tree, not more than 300 remained in less than two months!" When one tells a fish, snake or bear story, he should not be staggered by facts, but represent his creature as the biggest of its kind!

Foersch tells us, too, of experiments he personally witnessed, where the gum of the tree was used in the execution of several women; this by order of the Emperor. But, as the tree has long been grown in botanic gardens without danger to life or limb, we are obliged to dismiss these accounts as chimerical. The painful question of veracity is, fortunately, not for us to debate. Even the most honest travelers, as Mungo Park, Sir John Mandeville, Messrs. Huc and Gobet, and Robinson Crusoe, may prove credulous and accept too much on hearsay.

It is quite possible, moreover, that the stories grew up in a perfectly natural way. In the first place, the plant is confessedly noxious. Then, it frequently grows in low basins, or valleys, rendered dangerous by the escape of carbon dioxide from volcanic vents. This gas, as everyone knows, is very heavy and is retained in such depressions as in the cavern of Pausillippo in Italy and elsewhere. Sulphurous acid, equally deleterious, is also given off by these vents, "so that doubtless the upas tree has had to bear the opprobrium really due to the volcanoes and their products." The plant is, however, unquestionably virulent. "The inner bark of young trees, which is fashioned into a coarse garment, excites a most horrible itching." Is this the classic shirt of Nessus? "The dried juice, mixed with other ingredients, forms a most venomous poison, in which the natives dip their arrows."

The tree belongs to the family *Artocarpeae*, nearly related to hemps and nettles. It is monoecious, with unattractive flowers.

Brown University.

BOTANY FOR BEGINNERS—XXIII.

ORDER 7—XYRIDALES.

NEXT to the great *Arum* family, in most systems of classification, comes a queer group of diverse forms, that the botanist in temperate regions is likely to know little about. We have representatives of most of the families, to be sure, but the great bulk of the species are inhabitants of the tropics. These species have a curious predilection for the American tropics. Some whole families are exclusively American and the others are most abundant on our side of the world. These families are at present grouped into the order Xyridales, but were formerly called the Farinosae. The seeds in most of the species consist of a tiny embryo surrounded by a great quantity of mealy albumen and this circumstance gave to the order the name formerly used.

Besides the yellow-eyed grasses (*Xyris*), whose generic name gives the present name to the order, the group is represented in our latitudes by the pipeworts (Eriocaulaceae), the wild pines (Bromeliaceae), the spiderworts (Commelinaceae) and the pickerel weeds (Pontederiaceae). Our species are, in every instance, the hardiest members of their race, but seldom extend their territory very far northward. Many of them, indeed, get no farther than our Southern States. This is particularly true of the Bromeliaceae. In most of the plants, no matter in what part of the earth they occur, a decided liking for a watery habitat is seen. This is most noticeable with us in the pickerel weed and pipewort. Such members as do not take kindly to the water often go to the other extreme and become xerophytes. Nearly all the Bromeliaceae are epiphytes and so constructed that they can go a long time without water.

In structure the flowers approach the typical monocotyledon flower. In most cases the perianth is divided into

calyx and corolla, and the latter is usually brightly colored, indicating that the flower is pollinated by insects. Each flower, however, is commonly subtended by a bract of some sort, which may be taken as one indication of their relationship to the arums. In many forms the stem does not produce lengthened internodes, and this results in the basal rosettes seen in the pipewort, the pineapple and in a measure in the yellow-eyed grasses.

Of the pipewort family we have barely half a dozen of the five hundred species. A single genus common in South America has more than two hundred species. The little seven-angled pipewort (*Eriocaulon septangulare*) is probably our commonest species, being quite noticeable about midsummer when its tiny, white, button-like flower-heads begin to appear along the borders of quiet ponds. These flower-heads are fairly typical of the family. Each consists of an outer involucre of scale-like bracts surrounding a cluster of flowers. The outer flowers are likely to be staminate and the inner pistillate, but in other species this arrangement may be reversed. From the resemblance of the flower-cluster to that of the asters, Rendle calls them "the Composites of the Monocotyledons." The flower-cluster is often woolly. Although most abundant in the American tropics, this family is spread throughout the world, chiefly in the warmer parts.

The yellow-eyed grasses, as their name indicates, are grass-like in appearance until they come into bloom. Then the spherical or oblong heads of overlapping scaly bracts, from each of which a yellow flower appears, at once indicates the difference. There are usually but one or two flowers in a head open at one time, which gives the inflorescence a ragged appearance. There are scarcely more than half a hundred species of this family, mostly in the tropics.

Our single representative of the Bromeliaceae is *Tillandsia usneoides*, the plant so conspicuous in the Southern

States and known as long, gray or Spanish moss. It is not a moss, however, for it flowers and fruits abundantly. Further south there are nearly a thousand species, but comparatively few of them moss-like. The well-known pineapple is a species of this group and a large number of the other species are fashioned on the same plan. On this account they are usually known as wild pines. The common pineapple grows in the soil, but many of the others are found high up on the branches of other trees. Unable in such positions to draw a supply of nitrogen from the soil, the sheathing leaves form reservoirs in which drowned insects and decaying vegetation collect and are then absorbed for the nitrogen they contain. The Spanish moss has leaves covered with fine scales, which absorb water from the air. The flowers of this group are often brilliantly colored and the bracts that subtend them frequently take part in the color scheme. The flowers secrete nectar about the ovary and appear to be cross-pollinated. The seeds are in many instances provided with a feathery pappus, which enables them to travel about in the air until a favorable site on the branch of a tree is found.

The spiderworts are more abundant in our region, but still are a mere handful compared with the more than three hundred species in warmer regions. Most of the species are noted for the short duration of the flowers, which, however, are brilliantly colored, and probably remain open long enough to entertain the pollinating insects. There is some evidence to prove that some of the flowers are capable of self-pollination. In an Old World species (*Commelina Benghalensis*) cleistogamous flowers are produced from the rhizome.

The pickerel weeds form a small family of less than twenty-five species, four of which belong to our part of the world. The common pickerel weed (*Pontederia cordata*) is famous for having three forms of flowers—with long, short

and medium lengths of styles and stamens. Darwin was especially interested in them. Among the writer's valued possessions is an autograph letter from Darwin to Asa Gray, asking for information on the subject. The water hyacinth (*Piaropus crassipes*) is also a member of the Pontederiaceae. At the North it is often cultivated for its handsome flowers, but in the bayous and sluggish streams of the South it has become something of a pest, growing so luxuriantly as to entirely cover the water. It is said, however, that cattle are fond of the succulent leaves, and what was once a pest may in time come to be a valued crop.

A VEGETABLE TRAMP.

BY WALTER ALBION SQUIRES.

OF all the plants I have known, there seems to be none so deserving of the name of tramp as the common mullein. Like its human prototype, it is a wanderer in many climes and warms itself on the sunny side of railway embankments from Maine to California. It is a dweller by the dusty roadside and in the rocky pasture. An outcast of the vegetable world, at home in any spot, and yet forever homeless, it dwells beside the garbage heap and sends up its tall spikes amid the tin cans and dismantled bed-springs of every dumping ground throughout the land. It seems to cling especially to the outskirts of large cities, though it is also found far within the wilderness. In the West I have often seen it standing in autumn and winter, tattered, ragged and brown, on the rocky bars of rivers, in the vicinity of towns. These river bars are also favorite gathering places for other wanderers—human derelicts, the abandoned of mankind. Here, crouched upon the sand, their only habitation the sheltering willows, and with the rounded pebbles

for their hearthstone, they watch and tend the fire beneath the coal-oil can, which contains their heterogeneous fare.

About twenty miles west of our old home in Northern Kansas was a portion of that long line of low mounds in which the Dakota sandstone stretches nearly across the state. One day my brother brought back from these mounds some mullein stocks, the first I had ever seen. With boyish interest I wished to see what the living plants were like, and scattered the seed about the barnyard and pasture. I soon forgot all about the mullein seed and never suspected the nature of the few large woolly leaved plants which made their appearance the following year. But the year after they soon made themselves known by sending up their long spikes of yellow flowers. They seemed to thrive for a while and increased in numbers, but after a time their numbers grew less and in a few years they were gone. The old barnyard and a certain rocky portion of the pasture where they grew would seem to have been an ideal place for them. It would almost seem as though they, like their human kindred, had lived so long on the "seamy side," had wandered so far and wide, that they could no longer settle down in any place, however favorable, but must needs yield to the instinct to rove and be off again.

I have seldom been in a locality where a few plants of the mullein could not be found. I have frequently noted it throughout Kansas, Missouri, Iowa and Illinois, as far as the shores of the Great Lakes. On the Pacific Coast it seems to be fairly abundant throughout the Sacramento Valley, the Rogue River Valley and the Willamette Valley, and about the Puget Sound country. Here in Northern Idaho I have found it at high elevations, far back in the wilderness. To what extent it is to be found in the great arid tracts of the West I am unable to say, but I found it quite plentiful far out upon the plains in the country about

the Cimarron River. It did not appear to be affected there by the dryness of the climate, though the abundance of cacti, yucca and artemisia, together with other xerophytic vegetation, plainly indicated the beginning of the desert.

The mullein has been so long a wanderer, and has invaded so many lands, that it is difficult to determine its original home, though it is doubtless a native of some part of Europe. Some idea of the length of time that has elapsed since man became acquainted with it may be gained from the fact that the word mullein came down to us from the Anglo-Saxon, and it is not improbable that our Teutonic forefathers were acquainted with it long before they crossed the English Channel.

Kooskia, Idaho.

ABOUT NUTMEGS.

THE nutmeg of commerce is the aromatic achene of one of several evergreen species included in the genus *Myristica*. It is a native of the Moluccas, but is also distributed to the neighboring islands of the East Indian Archipelago, where it occurs in gregarious groups locally known as nutmeg-groves. During the ascendancy of the Dutch in the East Indies, it was the chief economic product of the Spice Islands, but its commercial value, like that of pepper, has declined considerably in recent times. It is, however, still valuable enough to make its cultivation profitable to the local agriculturist, for even in India it at present sells at from a quarter to half an anna per nut, not to mention the sacelet aril or mace, which is even more valuable than the nut itself. The evergreen forests of the moister regions of India and Burma contain several species of wild nutmeg. The *Myristica longifolia* and

M. attenuata may be mentioned as two common examples to illustrate the prevalence of the genus there. But the more delicate dark-foliaged *Myristica fragrans*, the source of the commercial product, is by far the most important and valuable member of the group. This species occurs in India only under cultivation. It was introduced by the Dutch into the island of Ceylon, whence in time it came to be disseminated over the mainland of peninsular India. It flourishes in all warm, moist localities, particularly if these be situated on or near the banks of rivers. It demands a rich, free, well-drained soil and an abundance of aqueous vapor in the air.

Besides the ordinary uses to which nutmegs are applied in India, they are now-a-days very much in requisition in Europe for the manufacture of the substance known as "nutmeg-butter." This remarkable product is only the essential oil of the nutmeg, which is a solid or fat at all ordinary temperatures. It furnishes an example, which is rare in the vegetable kingdom, of a volatile oil combining with a fixed oil to produce a solid glyceride or fat. Nutmeg-butter is used in Europe in the manufacture of scented oils, perfumes and soaps, but chiefly as a flavorant in cooking and confectionery.

The great point in favor of nutmeg fat is that, like the oil of bennuts (*Moringa pterygosperma*), it does not turn rancid, even after long keeping, and may be prepared in any quantity for home consumption.—*From an article in Indian Planting.*

INSECT GALLS.—Those who are inclined to a further investigation of insect galls, to which Mr. Dobbin called attention in the November number, will find a pamphlet by Wm. Beutenmuller, issued by the *American Museum Journal*, of New York, very interesting and helpful. The price is 15 cents.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

STRAY-BERRY.—According to *Gardening World*, the strawberry was originally called stray-berry, from the habit of its runners in straying from the parent plant.

AGES OF FUNGI.—The mushroom is often referred to as typical of rapid growth and equally rapid decay, but some of the woody fungi are among the most enduring of plants. According to Atkinson, some of the shelf-fungi (*Polyporaceae*) may live to be eighty years old.

THE FRENCH MULBERRY.—In late autumn certain parts of Eastern Kentucky and Tennessee are bright with the magenta colored berries of the French mulberry (*Callicarpa Americana*) that do as much for the landscape as do the berries of the winter berry (*Prinos verticillata*) farther north. The mulberry is fond of old fields and waste places and would seem a very desirable species for decorative planting in regions where it will grow.

MENTHOL.—Menthol, sometimes known as peppermint camphor, is a solid constituent of peppermint oil. It is said to be obtained by cooling peppermint oil to a very low temperature. Although we commonly think of this oil as being derived from *Mentha piperita*, there are several species of mint from which an oil with properties resembling it may be obtained. It is said that Japanese menthol differs slightly from the American product in odor, because that produced in Japan is made from a different species of mint.

PEPPERMINT OIL.—According to a recent bulletin of the United States Department of Agriculture, this country seems to be the chief producer of peppermint oil. In addition to what is used at home, we annually export from 50,000 to 100,000 pounds. The price ranges from 75 cents to \$4 a pound, depending upon the supply. The plant from which the oil comes is the well-known peppermint (*Mentha piperita*) and its varieties. It grows wild in many regions and although called American mint, is an immigrant from Europe. The oil is obtained by distillation.

THE SKUNK'S CABBAGE.—In late spring and early summer the broad leaves of the skunk's cabbage are busy making the starch which is stored underground in its thick rootstock. When the great flower-clusters start upward this store of starch is drawn upon as the material from which the tissues are built and energy furnished. Some of this energy appears as heat, as may be easily seen by the use of two thermometers that register alike. Suspend one near the spathe and place the bulb of the other inside the spathe. The latter will soon indicate a higher temperature. It is interesting to note that our common species is also found in Japan.

SUGAR FROM TREES.—So accustomed are we to the manufacture of sugar from the sap of the maple that we are likely to think this the only tree from which sugar may be obtained. As a matter of fact, the sap of many trees contains sugar in appreciable quantities and might be turned to good use were maples less abundant. This is the case with the butternut (*Juglans cinerea*) and the black birch (*Betula lenta*). Both these trees produce an abundance of sap, but in this respect are exceeded by the yellow birch (*B. lutea*), though its sap has less sugar. The butternut sugar is said to taste much like maple sugar. The sap is obtained, as in the maple, just before the buds unfold. In other lands several species of palm yield sugar.

SEEDS AND LIGHT.—It is commonly supposed that seeds need light to germinate. This error is, no doubt, due to a confusion of the requirements of seeds and seedlings. Seedlings need light, of course, but we have only to reflect that nearly all seeds germinate too deep in the earth to receive any light. We may say, then, that ordinary seeds do not need light for germination; in fact, it is said that the seeds of larkspur and poppy will not germinate when exposed to the light, and the same has been proven true in the case of *Acanthostachys strobilacea* and *Phacelia tanacetifolia*. Notwithstanding this, the seeds of plants that do not naturally grow in soil may require the light. In *Drosera capensis*, one of the sundews, and in the mistletoe (*Viscum album*) light is said to be necessary to germination.

THE TUBERS OF THE ARROW-LEAF.—Man has apparently made use of but a small part of the plants that are available for food. Nearly all the species of arrow-leaf (*Sagittaria*) produce tubers in the fall which in some cases reach the diameter of an inch or more. They are filled with starch, somewhat like the ordinary potato, and designed to continue the life of the plant in spring. The Indians, who from necessity used many articles of food that we do not, knew and relished these *Sagittaria* tubers, and the Indians of the Northwest called them by a name which means swan potatoes. No doubt the size of the tubers could be easily increased by cultivation and there are at present many acres of wild, boggy land in which the wild plants grow almost to the exclusion of all else. All we need is a botanist with Burbankian tendencies to acquire a new food plant.

THE MULLEIN IN THE ROCKIES.—Since writing the note for the October number of the AMERICAN BOTANIST I have found other data in regard to the distribution of mullein in Colorado. I find it is frequently found around Boulder and other places not familiar to me. However, the

problem of distribution is not solved, as the mullein plant is indigenous to Europe, introduced westward and throughout the United States as far west as Eastern Kansas. Britton and Brown in their flora mention the probability of one species being naturalized in the West, and Prof. Aven Nelson, in his small manual, records *Verbascum thapsus* as growing in Wyoming. However, in his "First Report on the Flora of Wyoming," issued in 1896, no mention is made of mullein. All the plants I have seen here grew practically in xerophytic conditions. What agent or agencies has brought it to the foot of the Rockies is the question.—*Earl Lynd Johnston, Evans, Colo.*

SHALLON.—Since I sent you my last shallon article I have had access to the Journal of Lewis and Clark and have hunted out the first reference to shallon ever made in literature, as I understand it. They were well along down the Columbia River, not far from where I found my spray of flowers. The eating of roots, barks and berries had made them all sick. Clark reports that he was very weak and unable to eat on account of stomach disorder. On December 9, 1805, Clark writes: "In the evening an old woman presented a bowl, made of a light-colored horn, a kind of surup made of dried berries, which is common to the country, which the natives called *shele wele* * * * they gave me senip made of bread of the shele wele berries mixed with roots." Here we have it as Clark wrote it first of all: *shele wele*. But on the page before me, both in parenthesis and by reference to bottom of page, is explanation of the editor that Clark meant she-well, salal, sallo or shallon. It is worth knowing that Captain Clark wrote the "old squar's surup" was made of berries which the natives call shele wele, and that the senip was made of bread of shele wele berries.—*W. W. Munson, Pasadena, Cal.*

Editorial.

In common with all other magazines, we annually receive a large number of applications for sample copies from people who subsequently do not subscribe. Of course, all have their reasons for not subscribing, but it strikes us that if we could find out what these reasons are, discover what the non-subscribers are looking for and give it to them, we would obtain the very thing *we* are looking for, namely, a larger subscription list. We have therefore selected from the list of applicants received during the last three months certain persons to whom we shall send a marked copy of this note. To all who receive this marked copy we make the following offer: To the writer of the best criticism of the magazine received before March 15th we will give a year's subscription and a 50 per cent discount on the price of all back numbers, if desired; to the writer of the second best criticism we will give a year's subscription and a 25 per cent discount on the price of back numbers, if desired; and to all who send criticisms we will send a free copy of the March number. It will be seen that letters praising the magazine will stand no chance at all. We do not want praise; we want pointers. If we cannot find out why you, personally, did not subscribe, we cannot make the magazine so that it will attract, in future, people with tastes like yours. Is the magazine too technical or not enough so? Do you prefer more illustrations? Would you rather have mere pictures than text that is of interest? Do you prefer more articles about collecting? More plant descriptions? Do you like more, or less, Note and Comment? In what particular phase of botany are you most interested? What other botanical magazine do you take? Why do you think it better than ours? These and similar questions are what we want

answers to. Address these letters to the editor at Joliet, Ill., and send them as soon as convenient. Although this offer does not apply to present subscribers we will add that we shall be glad to consider any suggestions they may make for improving the magazine. The editor has no particular line of botany to which he is committed; his sole interest is in giving the botanical public what it wants.

* * *

In addition to what Dr. Bailey has said in this number about the "deadly upas tree," the editor notes that he has had occasion to spend several pleasant mornings in the shade of what is probably the largest upas tree in the western hemisphere. We noted that the small birds flitted among its branches, lizards played upon its trunk and grass grew in its shade, exactly as they would do with any other tree. Moreover, the authorities had placed a seat close to the trunk and upon this seat we rested while ruminating on the credulity of the general public in botanical matters.

* * *

The editor, who keeps one eye on the subscription list, notices among recent additions an unusual number of teachers of botany, and being himself a teacher of botany, suggests to these teachers that any hints or criticisms that will help make the magazine of greater usefulness to them will be appreciated. It has been his aim to put into the publication such matter as may interest the general public in the plants themselves, believing that when such an interest is aroused the actual work of teaching is greatly diminished. He has not pretended to offer directions for class work, knowing that teachers who read the botanical magazines do not need such directions, but will gladly receive notes or longer contributions that will advance us toward the goal for which we are striving.

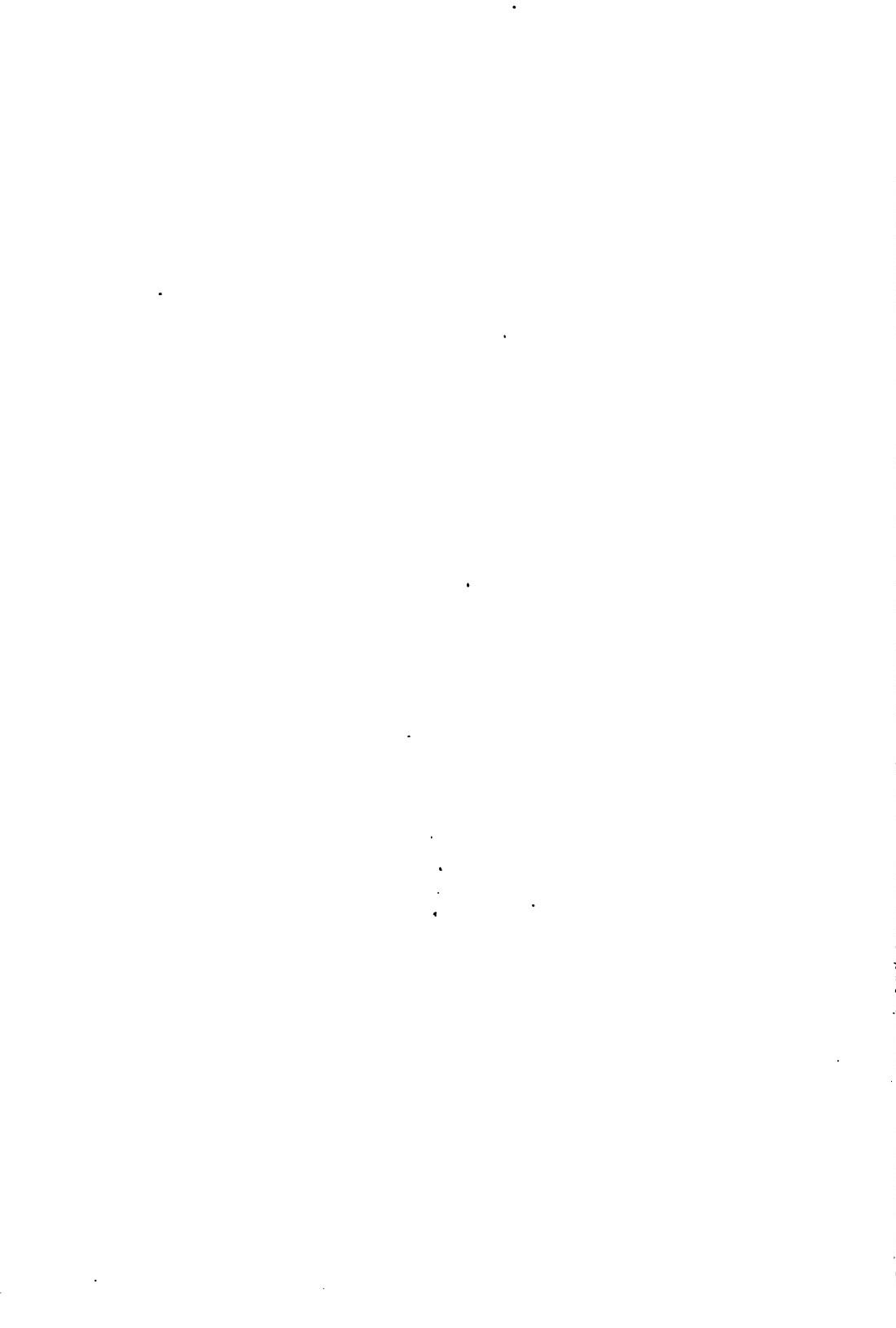
BOOKS AND WRITERS.

A volume on the spring flora of Illinois, by Messrs. Kellerman, Schaffner and Gleason, of Ohio University, is announced for early publication.

Nature Notes, the official organ of the British Selborne Society, has decided to broaden its scope, with a view to interesting those outside the society in its work. *Nature Notes* is one of the best of natural history magazines and has no exact counterpart in our part of the world.

Frederick Leroy Sargent, whose articles on "Lichenology for Beginners" appeared in the *Bryologist* last year, has reprinted them in neat pamphlet form for the use of students of these plants. It does not seem very easy for beginners to get hold of this subject, but this pamphlet will be a great help in that direction. There is a very good key and descriptions of the principal species, with considerable general matter, including instructions for collection and study.

A series of "Laboratory Outlines for General Botany" have recently been issued by their author, Prof. John H. Schaffner, of Ohio University. These originally appeared in the *Journal of Applied Microscopy*, but have since been extended and rearranged and are designed to cover a college year in botany. The outlines are similar to those in use, in one form or another, in all schools where the science is taught, and are in most convenient form for the use of pupils. It is to be assumed that the outlines are to be supplemented by lectures by the teacher. The outlines are both varied and complete, but with a somewhat greater leaning toward the verification method than the reviewer favors. There are also directions for staining and mounting specimens, making reagents, etc. The volume is an excellent one to use as the basis of a course in botany, whether in the high school or college.





SKUNK'S CABBAGE—*Symplocarpus foetidus.*

THE AMERICAN BOTANIST

VOL. X

JOLIET, ILL., MARCH, 1806.

No. 3

OUR NATIVE ARUMS.

THOSE who take their botany as a recreation, rather than a business, commonly do not care for the nice distinctions that employ the scientist. They shun the grasses and sedges, with their hundreds of species difficult to separate, and look with more favor on the buttercup, heath and lily families, where most of the species are so distinct and clear-cut that after one has identified his plant there comes no disquieting afterthought to suggest that possibly after all it is not the species he thinks it is. Your ordinary flower-lover wants no puzzles among the plants; no species that must be sent to the distant scientist to be verified. As well stay in the house and study geometry as to go afield and study the modern *Crataegus*. It is well indeed to know all the minute differences among the plants—the scientist is entitled to our honor and admiration—but for a botanical holiday we turn to the plants whose bright hues, pleasant fragrances or strange shapes attract attention and make the naming of the specimens easy.

A further attraction attaches to those families that are few enough in numbers to warrant the hope that we may eventually collect them all. There is great satisfaction in completing some department of our knowledge; in writing finis to some special undertaking. No doubt these considerations have something to do with the interest the beginner takes in the Arum family, though the curious shapes of the flowers, unparalleled by other plant families of our acquaintance, may also act as a contributing cause.

In most of the Northern States this family has the honor of furnishing the first spring flower. While yet the maple-

buds are unmistakably only buds, and the hazel catkins have shown no signs of relaxing, while pussy willows are still far from showing flowers, this firstling of the year, this leader of the vernal carnival, pushes up its spotted hood by swamp and stream and bids the milder season welcome. Lacking the fragrance of the arbutus or the delicate beauty of the hepatica and dubbed with an offensive name, the skunk's cabbage (*Symplocarpus foetidus*), lays no claim to a favorite's place, but thrives none the less lustily among the greening rushes, giving the first pollen to the bees and the hope of spring to the early rambler. Sometimes, in the latitude of New York, the first flowers appear by the middle of February. These are favored individuals, growing where the living waters of some nearby spring keep the ground unfrozen through the winter, but shortly afterward every swamp is dotted with the pointed spathes. No one can mistake the purple-spotted, shell-like flower-cluster, just peeping above the mud and water. As they commonly grow they appear stemless and un-flowerlike, but if by chance they push up under water they may develop a stem several inches in length, when a decided likeness to their regal relative, the calla lily, is seen. It is generally supposed that the flowers have a strong and fetid odor, but this is incorrect. It is only when leaf or stem is bruised that any odor is noticeable.

Though often found in bloom surrounded by water, the skunk's cabbage usually does not grow in places that are inundated the season through. Its habitat ends near the line of standing water, but just beyond appears an ally, the water arum (*Peltandra undulata*). Its arrow-shaped leaves rise above the water in thick clumps, while below them on long stems the slender, green, pointed spathes enclosing the flower-clusters spread about. No ordinary flower-gatherer considers this so-called flower worthy of a place in a bou-

quet and one looks in vain in the popular handbooks for a description of it. If the manuals had their way it would be common in most of the states east of the Mississippi, but it appears to be by no means a common plant. As the berries mature this species has the curious habit of bending the spathe downward until the tip reaches the mud, where it decays and probably sets the fruits free. In the South Atlantic States another species, *Peltandra alba*, with a white spathe, is found. Otherwise it is much like its relative.

It is noticeable that all our species of this family show a preference for a watery habitat. Those that are least influenced in this direction are the Jack-in-the-pulpit (*Arisaema triphyllum*) and its relative, the green dragon (*A. dracontium*), but we all know how the first loves a moist, rich spot in the woods, and how inclined the dragon is to haunt the banks of streams. No one needs a description of Jack-in-the-pulpit. The purple-and-green streaked spathe drooping over the erect spadix is familiar to every child who has even a speaking acquaintance with the spring woodlands. As Indian turnip, the underground parts have served as the basis of many a school-boy's practical joke. It is almost worth anybody's while to carefully nibble this pungent corm by way of experiment. It should be tasted, however, not chewed. One may be duly impressed with its powers with a very small amount. Many tropical species have similar properties.

One may well wonder how the green dragon got its name. There is nothing dragon-like in its appearance, though the long, slender, green spadix, too long for the spathe, and therefore projecting some inches beyond it, gives the flower-cluster a bizarre look that must attract the attention if it does not compel the admiration. It needs no further note to distinguish it from the more familiar species, though if this were necessary the single leaf, curiously

divided into from five to seven leaflets, would quickly separate it from the trifoliate leaves of Jack-in-the-pulpit.

Although the inflorescences of this family are well known to consist of pistils and stamens seated on a thick stalk or spadix and the whole subtended by a bract or spathe, it is customary to speak of the whole flower-cluster as a single flower. In this sense the flower-clusters of the wild calla (*Calla palustris*) come nearest to deserving the name. The spathes are whitish, flat or spoon-shaped, and are fairly like those of the cultivated calla, which, by the way, is not a *Calla*, though it does belong to the arum family. The leaves also resemble the cultivated plant. The wild calla delights in the more watery parts of open swamps, where it may spread out its spathes to the sun. It is nearly always to be met with in suitable situations and is found in Northern Europe and Asia also.

The sweet flag, or calamus root (*Acorus calamus*), is another product of wild nature which is considered desirable treasure by school-boys, but it may be doubted if in digging it up its relationship to the Indian turnip ever occurs to them, though its warm, aromatic flavor might give them a hint. It is the most un-arum-like of its race, with long, narrow leaves like those of the cat-tail or the blue-flag. Indeed, the common name of sweet flag seems to have been given our species to distinguish it in the popular mind from all other flag-like plants. Its flowers are seldom seen, though they are not rare, because they are colored exactly like the leaves; or, if seen, they are not recognized because so little like flowers. There is no spathe, at least nothing at first glance that looks like one, and the cluster of flowers, like a stiff, green cone, seems to spring from the side of one of the leaves, about midway from base to tip. A closer look, however, convinces us that this leaf-like affair is really a spathe, which is continued beyond the flower-cluster.

After all, a spathe is morphologically a leaf, so why should it not be green and flat upon occasion? The spadix, with its cluster of flowers, is also edible, and has the same pungent flavor as the root, but in lessened degree. The seeds are said to be usually defective, as they often are in plants with other means of multiplying.

Rarest and most curious of all its tribe in our region is the golden club (*Orontium aquaticum*), which delights in sphagnum bogs and the muddy borders of small lakes, where it thrives in several inches of water. It will be recognized at first sight by the slender, club-like spadix, green at the base, white above, and tipped with bright golden yellow. In vain one looks for a real spathe. At the base of the club is a papery sheath that receives the name, but it plays no part in the flower-cluster, as do the spathes of all our other arums. The leaves are spoon-shaped and when growing in water rest upon its surface. The seeds are edible and are said to have been used by the Indians, who boiled them much as we do peas. This fact may account for the peculiar distribution of the plant. It is found usually near the sea coast from Massachusetts to Louisiana, but also occurs irregularly inland. In these latter situations it is often very abundant, and it is conjectured that such places were planted by the Indians with an eye to their food value.

BUDS.

BY DR. WM. WHITMAN BAILEY.

BUDS well illustrate the ignorance of people about common things. Persons who would look surprised and grieved because we confessedly know nothing of the integral calculus and have misty ideas of a great many things not too evidently ethical that occur in business, will yet ask

strange questions about objects one would suppose them to have known since childhood.

Almost every year, in January and February, we have a few buds of horse-chestnut, hickory and Norway maple for study and pleasure. The delight may be combined with study, or it may be apart from it entirely; but the study is sure to bring delight, while the joy may lead to further investigation. Often a person of so-called liberal culture will salute us with the remark, "Why, how forward those buds are. A friend of mine saw trailing arbutus in bud the other day. It is going to be an early spring, is it not?"

Now, as a matter of fact, the buds in question and those of elm and a number of other plants, have been in just about the same condition since last August or even earlier. Few people ever look at them. What's the use? They will take care of themselves just as well as if we knew all about them. True, as regards the buds, but it may be our soul's salvation would be safer for a glance.

From a purely practical point of view—and it is the "practical" that is eternally dinned into a botanist's ears—one never knows how soon an observation made in the secret of the closet or laboratory may become of value in the market-place. My own father, studying diatoms and other microscopic organisms for the delight their beauty gave him, was one day called upon by the United States government to investigate the mud from the Atlantic floor to prove whether such a bed was able to bear the telegraph cable. Professor Huxley on the other side and Ehrenberg did the same. These quiet savants suddenly became important. So Louis Pasteur probably little foresaw to what his early researches would lead in the cure of disease or mitigation of human suffering or in the saving of so important an industry as grape growing.

To return from a long digression, buds are young shoots or branches. They may contain foliage or flowers or both, but always they belong to the stem and leaf features of the plant. This, their position, either terminal or axillary, determines; also their structure when dissected. Nothing, by the way, can be prettier than the interior of some buds. Take, for instance, that of the horse-chestnut. Outside it is covered with glutinous scales to turn water which, getting under them if unguarded, might freeze and rend the bud. Right here I am often asked by college students: If this is such an excellent plan, why do not all buds exhibit it? I usually anticipate by saying in a casual way that each plant has its own problems to solve; and what is good for one is not, perhaps, good for another. In briefer form, I own up squarely that I don't know. Good Professor D. C. Eaton, of Yale, told me early in my career as a teacher never to pretend I knew what I didn't. "The student is sure to catch on!" With his words dwelling in my memory I have avoided many sloughs.

After removing the outer sticky scales of our horse-chestnut, we find the subsequent foliar bodies more and more leaf-like, till, finally, we reach the true leaves—seven-fingered, woolly leaves, neatly folded and packed away. Sometimes we will discover in addition the inflorescence resembling a minute cauliflower, which itself is nothing but a mixed bud, never advancing beyond the bud condition. One hates to disrupt these little folded hands. How securely nature has packed them away!

Take, again, beech buds, long, tapering lance-points. The leaves within are things of rare beauty, delicate to evanescence and clothed in the costliest silk. In some buds, horse-chestnut or other, we will find in miniature the whole inflorescence of the year. The microscope reveals, in the tiny buds, what parts of the flower are formed first and the

consequent succession of organs. Youth is always interesting, babyhood even fascinating to the roughest of mankind. It is hence with peculiar gentleness that we handle these infantive buds. From them may issue the sinuate leaf of the oak, the lobed or jagged blade of the maple or the little fingers of the horse-chestnut, held out in blessing.

Providence, R. I.

BOTANY FOR BEGINNERS—XXIV.

ORDER 8—LILIALES.

IN tracing the development of the monocotyledons from their simplest forms it is rare that we find flowers with all their parts so clearly distinguished that the ordinary observer can recognize them until we reach the Liliales. There are, to be sure, indications of what is to come, for down in the scale, as may be instanced by the arrowheads among the Naidales, but for the most part the flowers are too little like ordinary flowers to be individually distinguished. Often, indeed, as in the grass family, the flowers are so inconspicuous that they may pass unnoticed, but with the advent of the lilies and their allies we find large, distinct and brightly colored flowers in abundance.

There are nearly five thousand species in the lily alliance arranged in from six to nine families according to the tastes of the botanist who does the arranging. Of these families the bunch-flowers (*Melanthaceæ*) and blood-worts (*Haemodoraceæ*) are small and not especially conspicuous. The smilaxes (*Smilaceæ*) are easily distinguished by their climbing stems and net-veined leaves. The lily-of-the-valley family (*Convallariaceæ*) was formerly placed among the true lilies, but has been separated from the rest because of its berry-like fruits. The yams (*Dioscoreaceæ*) are closely re-

lated to the amaryllis family, but may be distinguished by their climbing habit and dioecious flowers.

The four chief groups of the lilyworts are the rushes (*Juncaceæ*), the irids (*Iridaceæ*), the amaryllids (*Amaryllidaceæ*) and the lilies proper (*Liliaceæ*). The ordinary observer would scarcely place the common bulrush and its allies among such regal plants as lilies and irises, but that is certainly where it belongs, as may be easily seen by a glance at the flowers. It is true they are not much like the flowers of lilies in size and color, but in shape and structure they are exact little brownish or greenish lilies. So true is this that certain genera on the border line between rushes and lilies may be placed in either group without offending the proprieties. The iris family may be distinguished by the fact that the flowers have but three stamens and the ovary is below the rest of the flower. In the lilies and amaryllids there are six stamens, but these two families may be easily separated by the fact that in the former the flowers are hypogynous; that is, with the floral parts springing from the base of the ovary, while in the latter the flowers are epigynous, as in the irises. The species of amaryllis are usually called lilies, but if one wishes to distinguish between them a glance at the flower arrangement will settle the matter.

The plan of the flower is, of course, the same throughout the order. It consists of a perianth of two whorls, but with the parts so nearly alike as to appear like one circle, one or two whorls of stamens and a whorl of carpels. The number in each whorl is three. The perianth is usually not to be separated into calyx and corolla upon the basis of color, for the two whorls are commonly colored alike; yet in the trilliums the outer whorl is green and sepal-like, and in most of the others the three outer perianth segments are slightly larger or coarser, as if foreshadowing the typ-

ical flowers of Dicotyledons. In many species we may still find traces of the bract that enfolds the flowers of the lower Monocotyledon orders, as in the Amaryllids, where the flower buds are often enclosed in such a bract. In the Japanese species of *Rhodea* the small flowers are borne on a spadix not unlike that of some Arums. Mention should be made, also, of the peculiar outgrowths from the perianth of various Amaryllids, as in the narcissus and jonquil, where it forms a cup.

In general, the flowers of this order are large, and by their color, nectar and perfume indicate that they are pollinated by insects. Nectar is secreted at the base of the ovary or in special grooves lengthwise of the perianth segments. In the majority the flowers are regular and the nectar accessible to a variety of insects, but in the iris family and many of the Amaryllids the flowers are zygomorphic and adapted to certain insects only. In connection with one of the Amaryllids, a most remarkable case of symbiosis with an insect has sprung up, in which a moth (*Pronuba*) lays its eggs in the seed capsule of the yucca, and then to insure that the young seeds will develop and form food for its larvæ, deliberately gathers the pollen and places it on the stigmas. Only a few of the seeds form food for the larvae. the rest maturing. It is said that in regions from which this moth is absent the yucca does not mature its seeds. The irises, also, show great specialization for cross-pollination, and by an arrangement of stigma, style and sepal, manage to secure the attention of insects in just the right way to effect these ends. On the other hand, the rushes are practically all wind pollinated and are therefore actinomorphic, small and dull in color. Among the lilyworts we find a large number of delightful perfumes, but there are other members of the order, for example, the carrion flower (*Smilax*) and some of the trilliums, whose odors can be de-

scribed only as stenches. These odors attract flies, and the flowers are thus as effectively pollinated as any.

There are many things about the vegetative parts of this group that are of interest. For the most part, the leaves are long and narrow (linear), but many broad-leaved forms are known. Although this is a typical Monocotyledon family, some of the broad-leaved forms are net-veined, as in the yams and smilaxes. The great majority are herbaceous perennials, but a few like *Dracaena* and *Yucca* are shrubby or tree-like. The herbaceous species are mostly geophilous with the intermittent life-habit; that is, the main stem is underground in the form of a corm, bulb or rootstock. Into these underground parts the plants seem to retreat whenever danger above ground threatens. In our own region the danger is usually from cold, but in other parts of the world it may be extreme heat or drouth. In these underground parts a considerable food supply is stored, allowing a rapid development of the parts above ground when a favorable season returns. Man has taken advantage of the plants' providence, and regularly uses the food store of some species, as the yams and onion. Saffron comes from one of the iris family, asparagus, aloes and squills from the lily family. Sarsaparilla is obtained from one of the smilax family. The Liliales, however, are valued more for the beauty of their flowers than for their edible qualities.

The fruits of this order are either dry capsules or berries. The species with capsules have no very specialized methods of seed distribution, and the species seldom extend over very wide territory. Those with berry-like fruits, adapted to dispersal by animals, have a much wider distribution. The order, however, is represented nearly throughout the world, being very common in regions where xerophytic conditions prevail.

GRAPE FRUIT AND SHADDOCKS.

THREE is little doubt that much confusion exists as to what is really grape fruit, as distinct from the allied citrus fruits passing under such names as pumelow (invariably spelled pomelo in the United States), shaddock, forbidden fruit, paradise fruit, and others. These fruits are all, or nearly all, larger than the largest orange, and they are uniformly of a pale-yellow color. In texture the rind may be smooth or even polished. It is seldom rough, nearly always firm and not very thick. The pulp is pale-yellow or greenish-white, sometimes pink or crimson. The juice bags of the pulp are more distinct than in the orange and very juicy, somewhat sweetish, with a distinct but agreeable bitter flavor. In shape these fruits vary a good deal. Some are quite globular, others somewhat flattened at the top and tapering below, forming a pear-shaped body.

These fruits have been ranged under the giant citrus (*Citrus decumana*). This is supposed to be a native of the islands of the Pacific. It was introduced into the West Indies from China about 150 years ago by Captain Shaddock, in compliment to whom, since that time, the fruit has always been known in this part of the world as shaddock. The term shaddock may be correctly applied to any of the larger members of the giant citrus. The word pumelow, so widely used in India and Ceylon, is supposed to be a contraction of *pomum melo*, the melon apple.

All the larger-fruited sorts may, then, be called either shaddocks or pumelows; these are merely the Western and Eastern names for the same thing and are perfectly interchangeable. There are two well-marked varieties, one being globose, with the flesh of a pale-pink color, and the other pear-shaped, usually with a deep-pink or crimson pulp.

As regards the small-fruited sorts, these, according to Dr. James Macfadyen, the author of the "Flora of

Jamaica," may be either globose, when they are called forbidden fruit, or pear-shaped, when grape fruit (so-called because the fruits grow in clusters like a bunch of grapes) is the older name. The name forbidden fruit (from a fancied connection with the Garden of Eden) is tolerably old in the West Indies.

As usually happens, when a name has become familiar in commerce, it is eventually applied in a much wider sense than the original one. Thus, the term grape fruit has become so general that any moderately large fruit, provided the skin is pale-yellow, thin and smooth, and the pulp of a delicate flavor, is designated by it. The fruit commonly called grape fruit in New York is really the forbidden fruit of the West Indies. The true grape fruit is pear-shaped, and, according to Macfadyen, when obtainable at its best, is preferable to the forbidden fruit. The latter are in great demand, and they are regarded as the most refreshing and wholesome of any of the citrus family.

The grape fruit is not a shaddock nor a pumelow. It is quite a distinct fruit and possesses exceptional merits. It is in great demand in America, chiefly because it has been so highly recommended by the medical faculty for its valuable dietic and tonic qualities. It is also very refreshing and is regarded as a specific for dyspepsia.

There are, doubtless, many inferior sorts of grape fruit. In fact, in the West Indies, the plants have been allowed to run almost wild. No care has been taken to select the best varieties, or to bud or graft them so as to keep them uniformly at a high standard. There is no need to grow the thick-skinned and bitter sorts and those with a dry, cottony pulp, while there are varieties, both of the apple-shaped and pear-shaped fruits, with a silky skin, full of juice and of almost delightful flavor and with just enough bitter to give it piquancy and suggest its valuable tonic qualities.—*Indian Planting and Gardening.*

YERBA MATE OR PARAGUAY TEA.

THE plant from which yerba mate is produced is a species of holly, *Ilex Paraguayensis*. Last year not less than 35,000 tons were exported from Brazil and Paraguay alone. The common name of the beverage is Paraguay tea, although the use of the word tea is obviously incorrect.

The principal varieties of yerba are grown in Argentina, Paraguay and Brazil. The Paraguayan plant is the strongest, has the richest flavor, and commands the highest price. Next in quality is the Argentina yerba, grown only in the province of Las Misiones. It is steadily improving in quality, but the output is small and falls far short of supplying the demand. The yerba grown in Las Misiones is of three varieties: Yerba morada, with violet-tinted, dark-green, oval leaves, six to eight inches long and three to five inches broad, produces a very bitter and inferior quality; yerba blanca, conspicuous for its whitish dark-green leaf about half as large as that of the morada; and yerba caa-mi or amarilla, with a leaf of slightly yellowish color, and one and a half to two and a half inches long. This supplies the best of the native yerbas, although it is surpassed in quality by some varieties of the Paraguayan and Brazilian plantations. Brazilian mate, the cheapest of all, is produced in the greatest quantity, but is not so rich in flavor as any of the others.

Yerba mate is a mild stimulant and is also highly nutritious. In some parts of South America it constitutes nearly the whole sustenance of field laborers, who often drink ten and twelve cups daily. It has none of the bad effects of alcoholic liquors, and its use is therefore being strongly encouraged from the humanitarian and sanitary standpoint. It is also much more easily prepared for mar-

ket than coffee, the whole operation not lasting more than thirty-six hours.

The full-grown yerba plant is usually about the size of an orange tree, though it sometimes grows as high as twenty feet, with a trunk measuring over three feet in circumference. Its leaves are described as perennial, rather thick and coriaceous, with strong mid-ribs. The trunk and branches have a somewhat velvety appearance, due to a fine, fuzzy growth on the bark. The flowers are small, white and four-parted. The fruit is red, about the size of a grain of pepper, and contains four very hard-coated seeds.

The harvesting of yerba includes gathering both leaves and twigs. The first crop is taken when the plants are four or five years old, care being had not to remove more than one-fifth or one-fourth of the leaves from each tree. At six or seven years of age the crop from each plant should average sixty to eighty pounds, including uncured leaves and twigs. Even good-sized branches are often harvested, as the crop can thus be much more quickly gathered than if only the leaves are picked, although the woody parts impair the quality of the beverage, and, indeed, the best kind is made from selected leaves only. Yerba of this grade, however, is not found in the general market, as its cost is several times greater than when twigs and small branches are included in the gathering.

The beverage is given one of four names—"mate amargo," having a bitter taste; "mate dulce," sweetened mate; "con leche," when prepared with milk, and "cocoa mate," if mixed with cocoanut.—*From an Article in Tea and Coffee Trade Journal.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

TROPICAL TREES.—“In an ordinary temperate forest,” writes Dr. Francis Ramaley in *Popular Science Monthly*, “the number of species of trees can almost be counted on the fingers of two hands. The species in a Northern coniferous forest might be counted on the fingers of a single hand. In a West Java forest there may easily be fifty species of trees within a distance of as many feet from an observer. In the whole island of Java there are probably a thousand different kinds of arborescent plants—perhaps more.”

SPHAGNUM AND LIME.—The peat moss (*Sphagnum*) is so abundant in many parts of the world that it fills immense bogs, and its dead stems, mingled with other vegetable debris, form layers of peat many feet in thickness. In other parts of the world, however, the peat mosses are unaccountably absent, and it has been conjectured by botanists that their absence is due to large amounts of lime or other mineral salts in the water. This has been tested by E. N. Transeau, who finds that peat mosses, contrary to the general impression, are not prevented from growing by such mineral salts.

THE WATER-CRESS GENUS.—There are people who think that the water-cresses are still to be found in the genus *Nasturtium*, but for some years they have been masquerading under the name *Roripa*. This latter name was given to the plants in 1760 and quite forgotten until a botanist

dug it up out of the limbo of antiquity about one hundred and forty years later. A few followed this leader and called the plants *Roripa*, but they had their trouble for nothing. Another botanist has now found a name given four years earlier and the world is asked to call the plants *Radicula*. Why not call the whole proceedings *Ridiculous* and be done with it?

SEED DISPERSED IN THE CONIFERS.—There are two misconceptions prevalent about the conifers. The first is, that all plants belonging to this group are evergreen, and the second, that all bear cones. The larch or tamarack (*Larix Americana*) is a good example of one of these “ever-green” trees that is not evergreen, and the cypress (*Taxodium distichum*) is another. The behavior of this latter tree is the more surprising, since it is an inhabitant of the South and apparently not obliged to cast its leaves in autumn, as are the broad-leaved trees farther north. Not content with dropping all its leaves, it often drops some of its young twigs as well. All the trees belonging to the group are cone-bearers, at least by courtesy, though the fruits of some are as little like cones as they could be. That of the yew appears like a fleshy red drupe and the berries of the juniper are well known. In these cases the fruit is modified for distribution by birds or other animals. In the trees that bear cones of the familiar form, the seeds have a wing-like expansion of the seed-coat that aids their distribution by wind. The erratic cypress has still another method. Its cones are small, spherical, composed of very few scales, and fall to pieces at maturity. The seeds are surrounded by a thick, cork-like layer, which is apparently designed as a float for distribution by water, and the early breaking up of the cone thus facilitates the process. Since the cypress grows in marshy places or in standing water, this adaptation for distributing the seed is a most successful one.

Editorial.

Those who find this magazine helpful in its present form will no doubt be interested in the result of the invitation that was extended to critics in the February number. A good share of those to whom the marked copy was sent replied, and from these letters we feel that we have now gained a glimpse of the magazine from the point-of-view of the non-subscribing applicant, at least, that will be most helpful to us in planning future issues. The letter which, all things considered, we regard as the best, was written by Frank R. Miller, R. D. 3, Toledo, Ohio, and the second best was sent by D. A. Bright, Larned, Kas. To both of these gentlemen the magazine will be sent free for 1906. Mr. Miller also has the privilege, if he chooses, of obtaining all the back numbers for \$2.00, and Mr. Bright has a like privilege at the \$3.00 rate. To all other critics a copy of the present number will be sent.

* * *

One of the greatest surprises we received was the statement in almost every letter that the magazine is too technical! One of these critics, at least, is a graduate of a well-known university, but it is possibly needless to say he was not in the scientific department. All this time we have been flattering ourselves that this is the most untechnical magazine that ever happened, and now the public rises up and asks us to be more intelligible! We fail to see yet how we can become more so without dropping into words of one syllable. It begins to look as if botanical literature, even of the popular sort, has a dialect all its own which is but jargon to ears unaccustomed to it. Those who read and *do* understand may begin to realize the select company they are in.

Nearly all our critics, also, asked for assistance in breaking into the charmed circle about the goddess Flora. "Give us," say they, "more articles by which we may discover the names of the attractive flowers in our own woods and fields." To this we might reply that the magazine was started principally with a view to providing information for those who have passed the identification stage in botanical work, but there seems to be so great a demand for articles about the showy wild-flowers that hereafter we plan to have at least one article of this kind in each issue. It may be remarked in passing, also, that the series of articles on "Botany for Beginners," if read thoughtfully in order *from the beginning*, should place the reader in a position to understand at least the major part of what now appears in the publication.

* * *

After all, who is there among us that understands all he reads on even his own line of research? I do not question the mere understanding of the words, but that deeper understanding that takes and makes each idea or fact its own. One may read volume upon volume of descriptions of a plant, and see pictures in plenty, yet when he finds it, it does not fit the mental image previously formed. Nor does the mind readily take up unrelated facts. We must first have a peg to hang our information upon. As we advance in knowledge, facts that we have read and forgotten take on new meanings and become alive. Thus a second reading of a book or a glance through the old numbers of a magazine brings out beauties that we never realized were there.

* * *

Those who expressed any opinion on the subject, favored more note and comment at the expense of the longer articles. We hope our readers will all make note of it! There is probably not a week goes by in which every plant

student does not find something worth writing about; something which he would be sure to mention if we could go herborizing with him. A short note on the subject would add much of interest to our department, we are sure.

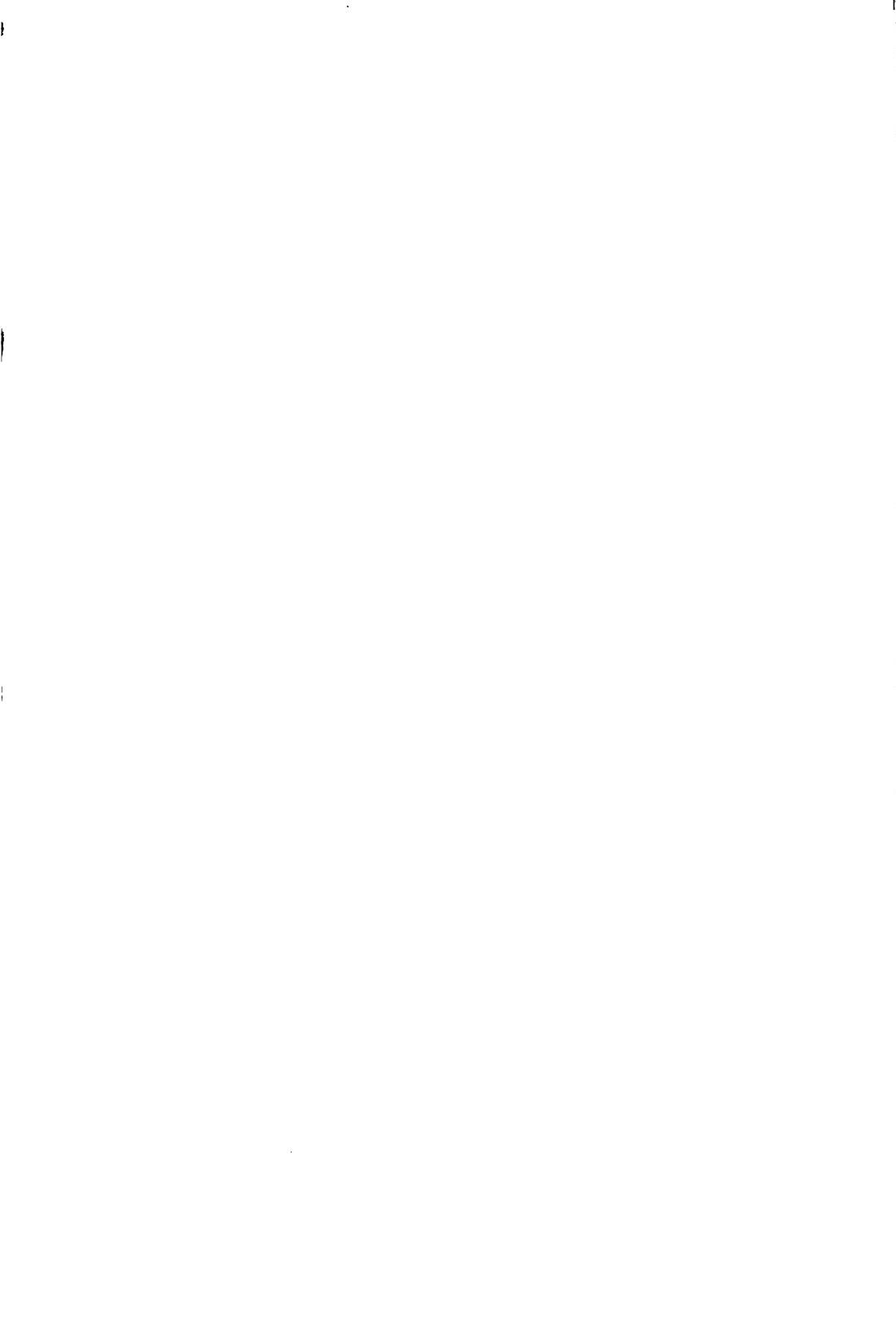
* * *

The November number of this magazine has been printed for at least six weeks, but has not been sent to subscribers for the very good reason that the postal authorities are still trying to make up their minds where the issue can be mailed. Our change in the mailing office seems to have completely upset their calculations. As soon as we receive a decision subscribers will receive their copies. Meanwhile the December number is in type and the printing and binding will not delay it much longer. It will doubtless be out in time to be mailed with the other number.

* * *

Our London contemporary, *Gardening World*, has issued free to its subscribers their "Handbook No. 1," which describes the fifty best roses for British growers. The handbook is written by the editor, John Fraser, F. L. S., F. R. H. S., and besides describing the plants gives full cultural directions and illustrates a large number of them. We are also indebted to this enterprising publication for a copy of their excellent pocket diary for 1906, which, in addition to giving ample room for daily memoranda, contains considerable other information of value to the gardener.

The Great Lakes Botanical Club has been founded by A. B. Klugh and a number of other botanists, for the study of botanical problems related to the region of the Great Lakes. At present the work will be carried on by a circulating bulletin to which all the members will contribute.





CATKINS OF WILLOW, ASPEN AND HAZEL

THE AMERICAN BOTANIST

VOL. X

JOLIET, ILL., APRIL, 1906.

No. 4

OUR AMENTACEOUS PLANTS.

THE amentaceous plants form a large part of our spring flora, though in but few instances can it be called a conspicuous one. With the exception of a few plants like the pussy-willow and the alder, the flowering parts are so little like ordinary blossoms that the casual observer rarely notices that they are in flower, and the botanist, himself, is usually not so familiar with them as he is with the more conspicuous members of our flora. Many people have an idea that several of these plants in some unexplained manner, bear fruit without the preliminary process or flowering. The average man is always surprised to learn that oaks bear flowers.

There are several reasons why these plants attract no more attention than they do when in flower. In the first place they have no showy petals or sepals to catch the eye, and the essential organs, the pistils and stamens, are usually greenish or pale yellow like the opening leaves. When these organs take on bright hues, as they do in the chestnut, willow and cottonwood, they at once become noticeable. Again, the size of the individual flower makes them very inconspicuous. It is only by being assembled in spike-like groups, called catkins, that they attract any attention at all. The catkin may be said to be the badge of the order. It varies with the species, but in all it is essentially a slender axis along which many flowers are clustered. These flowers are rarely composed of both pistils and stamens; usually the pistils are in one group and the stamens in another. Sometimes, as in the hazel, the two kinds of flowers are on different parts of the same plant; again, as in the

willow, the two kinds are on separate plants; and in others, like the chestnut, the pistillate flowers are clustered at the base of the staminate ament. The pistillate flowers in nearly all our species exhibit a tendency to be grouped in very short, few-flowered spikes. The staminate flowers are the ones that usually form the real catkins. If one will examine a single scale from one of these catkins he will find that it bears several stamens on the upper surface. The number and arrangement varies with the species, but in all, the stamens greatly outnumber the pistils and a great amount of pollen is produced. This abundant pollen is necessary to ensure pollination, since the wind is depended upon as a carrier. For the same reason most of the species bloom early in the year, before the leaves have appeared to prevent free circulation of the pollen-laden air.

The amentaceous trees are not abundant in the tropics, but the bulk of our arborescent flora is made up from this group. Among the plants that belong to it are the oaks, willows, birches, poplars, alders, hazels, hickories, walnuts, ironwoods, chestnuts, beeches, bay-berries and sweet-fern. The various groups may be distinguished by their blossoms, but other characters are often necessary for the identification of the individual species; in fact, the willows are among the most difficult of plants to name satisfactorily. The oaks and various others are best identified from their fruits, but most of them can also be recognized by their leaves and bark alone.

OUR VIBURNUMS.

BY DR. WM. WHITMAN BAILEY.

THE other day I was much surprised to receive from a lady in Foster some very fine specimens of *Viburnum lantanoides*. I had never seen it before from our own

state, although I had known of it as being found near Wal-lum Pond.

This plant, variously known as hobble-bush and way-farer's bush, is the most beautiful, on the whole, of its very lovely genus. It resembles a glorified *Hydrangea*. The broad cymes of small white, creamy flowers are surrounded by a circle of large, pure white neutral flowers. It will be remembered that *Viburnum Opulus*, from which is derived the snow-ball of our gardens, is, in its original state, the same. By cultivation the whole cluster is changed into abortive flowers, devoid of essential organs. Both species are more beautiful before such change occurs.

A great charm of the hobble-bush, apart from the exquisite old lace of its flowers, is its foliage. The generous heart-shaped leaves are rusty with a sort of tomentum, which, covering the fresh green of the blades, adds very much to their beauty. They are rugose-veiny and emerge from naked buds—things of infrequent occurrence in our inclement regions; indeed, we are so used to scale-protected buds that we are surprised when we find any other.

Howitt, in his "Book of the Seasons," thus addresses our shrub:

"Wayfarer's tree! what ancient claim
Hast thou to that right pleasant name?

* * * *

Whate'er it be, I love it well;
A name, methinks which surely fell
From poet, in some evening dell,
Wandering with Fancies sweet."

The bush or small tree may rarely rise to a height of twenty feet, but where we have seen it most abundantly, in New Hampshire, in New Brunswick, or about Mount Wachusett, it was not nearly so tall.

Viburnum Opulus, also native, has the common name of high cranberry, but is not related to the true cranberries of the Heath family and genus *Vaccinium*. I cannot remember to have seen this wild in Rhode Island. The berries of both these species are bright red and handsome, those of *Viburnum Opulus* having a peculiar translucent brilliancy.

Other species of *Viburnum* in our state are the maple-leaved, known as dockmackie and arrow-wood, which has blue or dark-purple berries; the *Viburnum dentatum*, with sharp-toothed ovate leaves and almost metallic blue berries; and the sweet viburnum or sheep-berry, a tree from fifteen to thirty feet high and with edible fruit.

These shrubs are very apt to be confused by the ordinary observer with some of the cornuses or dogwoods, also known as cornels. The entire, and peculiarly veined leaves of these, however, at once put one on guard. Among them occur our glorious flowering dogwood—and its pretty little dwarf imitator, the bunch-berry. These are not of the poisonous dogwoods, which are sumacs, with compound leaves and dirty-gray berries.

The cornels always impress upon the writer the mistake we commit in so often going far afield for ornamental shrubs when they grow, as it were, at our own doors. Think of the azaleas, rhododendrons, laurels, andromedas, not to speak of many others.

Brown University, Providence, R. I.

NEW USE FOR HOPS.—The time-honored use of hops for brewing may in this temperance age ultimately give way to other uses. In the Old World the young and tender tips are boiled and used as a garnish for meats. They are reported to have a delicious nutty flavor. Further experiments will doubtless be necessary before hop growers turn from brewing to boiling.

THE AMERICAN BOTANIST.

BOTANY FOR BEGINNERS—XXV.

ORDER 9—SCITAMINALES.

IT may be doubted whether the average lover of flowers is aware that an entire order intervenes between the lilies and orchids, but such is the case. This order has no representatives among our Northern flowers and is usually passed over in our text-books with little or no mention. In the tropics, however, it is of great importance, as may be surmised when it is known that the banana, ginger and arrow-root belong to it. The order shows very plainly its advance over the Liliales, in its zygomorphic flowers, and underground rootstocks and foreshadows the flower-structure in the Orchidales by the reduction in the number of stamens and the differentiation of the perianth into calyx and corolla.

Practically all the plants of this order are perennial herbs patterned very much after the form of our common Solomon's seal. There is a thick knotted underground rootstock from which aerial branches rise. These aerial branches are usually short and bear numerous broad leaves, which are often arranged in two rows, necessitating the placing of one leaf directly above another on each side of the stem. The inflorescence is terminal and consists of numerous flowers, subtending which large spathe-like bracts are noticeable. An excellent example of such bracts may be found upon the banana plants in almost any large greenhouse; for the type of a slightly different flower arrangement one may investigate the canna.

The flowers are all zygomorphic and usually highly colored. There are two whorls in the perianth and in most cases the sepal whorl and the petal whorl are distinguished by different colors. Normally there should be six stamens, but this number is rarely found. In the banana family there are often five fertile stamens, but in the other fam-

lies of the order it is common for only one stamen to be fertile, and in the canna and arrow-root families the reduction is still greater, there being but half a stamen functional. The original six stamens, however, are not entirely missing in most cases, but are turned into petal-like organs called staminodes that aid materially in guiding insects to the nectar and pollen.

The color of the flowers and the nectar seem to indicate the fact that the plants are not pollinated by the wind. It is equally certain from the size of the flowers in many species that they are not pollinated by insects. This, in fact, is one of the few orders that make use of birds as pollen carriers. Our own cannas are frequently visited by humming-birds as well as bees, and in the East Indies certain birds called honey-birds, from their fondness for nectar, assist in the transference of pollen. It is probable, however, that a majority of the species are pollinated by insects. The nectar is secreted in great quantities deep in the tube of the flowers. The fruit is either a capsule or berry. The canna fruit is a good example of the capsule, while the common banana is an example of the "berries" that this group produces. To call this a berry seems stretching the definition a trifle.

Four families make up the order Scitaminales; the banana family (*Musacæ*), the ginger family (*Zingiberaceæ*) the canna family (*Cannaceæ*) and the arrow-root family (*Marantaceæ*). Of these families the ginger family is the largest, containing more than three hundred species.. In this family is found the ginger-plant (*Zingiber officinale*) from whose rootstocks the well-known Jamaica ginger is made. The tumeric (*Curcuma longa*) and cardamom (*Elettaria cardamomum*) are also members of this family. The seeds of other genera besides *Elettaria* are called cardamoms. Our common cultivated canna (*Canna*

Indica) is the only familiar member of the canna family. This is the smallest family in the group with less than forty species. The rootstocks of several species yield starch. The starch-producing family, par excellence, is the Marantaceæ. *Maranta arundinacea* is the plant from which the arrow-root of commerce is obtained and the rootstocks of numerous other species may be used. There are nearly three hundred species of Marantaceæ in the tropics. In addition to our familiar banana (*Musa paradisiaca*) the Musaceæ includes the Manila hemp (*Musa textilis*) itself a banana, and the famous traveler's tree (*Ravenala Madagascariensis*). The banana family is not large, there being about eighty species included in it. Several species are grown for ornament and may be found in nearly any large collection of plants.

A FERN COMMUNITY.

BY FRANK DOBBIN.

SOME time ago I had opportunity to visit several times during the months of September and October a bit of the "forest primeval." It was only a bit to be sure, consisting of a tract of four or five acres on the premises of a wealthy farmer. Here the axe had spared a few noble old giants—elms, beeches and maples—which looked as if they might have been respectable trees before the Declaration of Independence was signed. Through the center of this bit of forest wandered a tiny brook, little more than a rivulet in fact. The moist, rich soil and the kindly shade made it an ideal spot for certain ferns, and right gladly did they take advantage of it.

All of the osmundas were present, the royal fern (*Osmunda regalis*) growing beside the brook, while over the fence in an adjoining meadow were both the cinnamon

fern (*O. cinnamomea*) and the interrupted fern (*O. Claytoniana*). The sensitive fern (*Onoclea sensibilis*) was present, as it nearly always is in such situations, as well as the ostrich fern (*O. Struthiopteris*), which lifted its tall fronds out of the black soil.

Here for the first time I made the acquaintance of the beautiful bladder fern (*Cystopteris bulbifera*), its long lanceolate fronds, usually bearing the little bulblets, hanging out over the brook in many places. Its near relative, the fragile bladder fern (*C. fragilis*), was also present, but its small fronds were nearly hidden by its larger neighbors.

Back a little way from the brook stood a clump of the silvery spleenwort (*Asplenium thelypteroides*), while by the fence at the edge of the wood lot were numerous patches of the lady fern (*Asplenium Filixfoemina*). Near the silvery spleenwort were a few individuals of *Nephrodium cristatum* var *Clintonianum*. Both the silvery spleenwort and the Clinton's fern were new to me at that time and it can be imagined with what eagerness I began a search of the manual for their names. Back in the deeper shade grew the Christmas fern (*Polystichum acrostichoides*) as well as *Nephrodium spinulosum* var. *intermedium* and of course the common *N. marginale*. Sometime later I found in a near-by wood, by the margin of a lake, a fern which proved to be *N. Boottii*. Perhaps a closer search might have proved that Boott's fern was also a member of the community. On the dryer knolls grew the New York fern *N. Noveboracense* and in the boggy ground by the brook the marsh shield fern (*N. thelypteris*.)

The most abundant of all, however, was Dickson's fern (*Dicksonia pilosiuscula*). It was scattered in dense mats through the more open and sunny parts of the wood. At this season of the year, September, its fronds were looking decidedly blase and hardly a perfect one could be found.

The little oak fern (*Phragopteris Dryopteris*) grew in the shade of some hemlocks, but was not at all abundant.

I also found *Botrychium tunatum obliquum*, or one of its numerous varieties, thus making a total of eighteen for this comparatively limited area. There were no rocks, and thus there was no opportunity to search for the rock-loving ferns. Considering this fact, I think the community rather a large one.

Shushan, N. Y.

A NEW BLACKBERRY FROM VERMONT.

BY W. H. BLANCHARD.

THIS is a dwarfish blackberry which belongs to no class yet described. The plants are dwarfish, erect, 5-foliate, yellowish with long, pubescent, glandular often branched racemes. From its yellowish color and dwarfish habit, it may be named.

RUBUS FLAVINANUS N. SP.

New Canes.—Stems erect, $1\frac{1}{2}$ to 3 feet high, yellowish, glabrous and nearly glandless, 5-angled and furrowed. Prickles rather slender, but strong, mostly hooked, situated generally on the angles. Leaves large in proportion to the size of the plant, very thin, 5-foliate, yellow-green and nearly glabrous on the upper surface, whiter, pubescent and velvety on the lower surface. Leaflets narrowly oval, long-pointed, cuneate at the base, coarsely and doubly serrate-dentate, outline entire, the middle leaflet widest. Petiole and petiolules grooved, slender, yellowish; prickles hooked, slightly glandular and pubescent; the petiolule of the middle leaflet $\frac{3}{4}$ inch long, the basal leaflets sessile.

Old Canes.—Erect, prickles somewhat impaired, stem slightly reddish, second year's growth, consisting of long

racemes, more or less leafy at the base. Axis nearly straight, sometimes slightly zig-zag at the base, angled, woolly pubescent with many glanded hairs. Leaves mostly 3-foliate, some unifoliate, thin, very coarsely serrate-dentate, the color and pubescence like those on old canes. Leaflets narrow, long-pointed, narrow wedge-shaped at the base. Raceme proper very long, resembling *R. nigrobaccus* Bailey, comprising most of the branch near the top of the plant, but less on the lower branches. Pedicels slender, woolly and glandular, set at a moderate angle to the axis and subtended by rather long and slender bracts. Flowers over an inch broad; petals narrow, less than half as wide as long; sepals conspicuously long and narrow, pubescent and glanded. Fruit maturing but very few drupelets, more often none. In flower late in June; fruit ripe the middle of August.

Type station in the yard and land adjoining the church in Stratton, Windham County, Vt. Dry, open ground. Altitude, 1,800 feet. This peculiar species was first noticed by me June 25, 1904, and was closely watched during the remainder of the season. The racemes and glandular pubescence reminds one of *R. nigrobaccus*, which is rare at this altitude, but in most respects it has no resemblance to that species. I have several anomalous dwarf forms that may be grouped around this.

Westminster, Vt.

SOURCE OF LACQUER.—It is said that the Japanese lacquer comes from a tree closely related to our own poison sumac (*Rhus venenata*) and that experiments have shown that our plant yields a very similar product. All that is needed to make good lacquer is some method of avoiding the poisonous exudations of the plant. There are few instances in nature where a really desirable product is so well protected as to puzzle man in his efforts to obtain it.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

THE USES OF BARK.—We are so accustomed to seeing thick and rugged bark on all old trees that we usually think it the natural result of age. According to Dr. Francis Ramaley, however, the trees in warm, moist regions, where they do not need to be protected from cold or from drying out, have smooth trunks, even in old trees. Some approach to differences of this kind may be seen in our own trees. Those with rough bark are usually found in the dryest and most wind-swept positions.

EDIBLE FERNS.—The young fronds of various species of ferns are occasionally used as pot-herbs in America, but we must go to the other side of the world to find such things among the regular articles of commerce. Tons of bracken (*Pteris aquilina*) and royal fern (*Osmunda regalis*) are used annually by the Japanese. The young bracken fronds are cut off before they have unfurled, soaked in wood ashes and water for a few days to get rid of the bitter taste and are then boiled like asparagus. The royal fern is collected just as the fronds are developing, and after boiling are pressed and dried for use as occasion requires.

SWAMP-PLANT PARTNERSHIPS.—All normal plants appear to be endowed with tiny one-celled root hairs near the tip of each root, by which plant food is absorbed from the soil, but various plants have set up partnerships with certain fungi whereby the fungi, in-

habiting the outer layers of the root, secure the necessary moisture and thus obviate the necessity for root hairs. E. N. Transeau reports in the January *Botanical Gazette* that in studying certain bogs in the Huron River valley he found a long list of plants with mycorhiza, as this root-fungus is called, among which may be mentioned the larch (*Larix Americana*), white pine (*Pinus strobus*), the black spruce (*Picea Mariana*), yellow birch (*Betula lenta*), dwarf birch (*B. pumila*), the cranberries (*Vaccinium oxyoccus*) and *V. Macrocarpon*, the running birch (*Chiogenes hispidula*), the blue berry (*Vaccinium corymbosum*) and Greenland tea (*Ledum latifolium*). Experiments seem to indicate that these mycorhiza develop only when there is not sufficient air in the soil.

YAMS.—In the United States there is considerable haziness as to the definition of the word yam. By many the common sweet potato of the South is so called, but this is a mistake. There are no yams grown in this country, unless a few specimens may be cultivated in Florida. It would be incorrect, however, to say that no yam species grow in the United States, for one *Dioscorea villosa* is found as far north as Canada. This is not considered an edible plant. The edible species most cultivated in the American tropics apparently belong to the species named *D. alta*, *D. cayennensis*, *D. sativa* and *D. trifida*. In Jamaica nearly twenty named varieties are cultivated that may be referred to one or another of these four species. The part eaten is the underground rootstock which in some forms reaches a length of four feet and a diameter of eighteen inches. One does not ordinarily go to market for yams, or even for a yam, but for a piece of yam. There is great difference in the flesh of the different varieties of yams, some being soft and white, while others are coarser and yellowish in color. All the plants bear a general resemblance to our common wild species.

ORIGIN OF THE TERM CONSERVATORY.—In the modern use of the word conservatory, we usually mean a glass house for growing flowers, but originally the conservatory was a glass house, usually attached to the dwelling, where flowering plants were kept only while in flower. They were brought to flowering in the greenhouse in some other part of the grounds and were returned there when their period of bloom was done.

A NEW STATION FOR SCHIZAEA.—One of the most interesting of the North American fernworts is the little curly grass (*Schizaea pusilla*). For a long time it was supposed to grow in New Jersey only. It has since been found in Nova Scotia and in Newfoundland, and in the October number of the *Fern Bulletin* is a report of its recent discovery in Cape Breton. There are many who think that this curious little fern will be found at other points between these extremes.

WESTERN MULLEINS.—We folks from "the East" always first think of *Verbascum thapsus* when mullein is mentioned. Though I have not seen this old familiar species in Southern California, it would not surprise me to meet it any summer day. I have often seen *V. virgatum* hereabouts. I saw *V. thapsus* in Northern California and in Oregon in 1904. At Glendale, Ore., I saw a single plant of *V. blattaria*. So on "the coast" I have seen only the three species that I have ever seen anywhere. That white mullein (*V. Lychnitis*), mentioned by the books as rare, I have never seen.—*W. W. Munson, Pasadena, Cal.*

BEES AND THE ODORS OF FLOWERS.—When the first crocuses opened in the editor's grounds this spring there were no other flowers of any kind, so far as known, within a quarter of a mile, and yet in less than two hours after the first one opened the honey-bees were on hand to gather the

pollen. The nearest hive of bees is about a quarter of a mile away, and the mystery still is how the bees at that distance knew of the flowers. To the human sense of smell the flowers have no odor, but it may be just possible that they are as fragrant to the bees as the lilac, locust or buck-wheat is to us. The bee has not remarkably good eye-sight, and it does not appear that the wandering bee would have so soon discovered the flowers had he been obliged to depend upon sight alone.

CHINESE SOAP-BERRIES.—Our Kentucky coffee-tree (*Gymnocladus Canadensis*) has, contrary to the statement in some botanical works, several relatives in China, some of which are used for washing purposes. The seeds and pods are the parts used. It is known that our own tree has saponin in the bark and it may well be questioned whether the seeds do not contain saponin also. The name of coffee-tree is said to be applied to this species because in the early days it was used as a substitute for coffee, but if the seeds contain saponin such use may well be doubted. Can any of our readers add anything to the solution of this puzzle? Do the seeds really contain saponin? Will someone in the region inhabited by the tree investigate and report?

AN AVIAN HERBORIZER.—The Australian bower bird has become famous for its habit of constructing play-houses, which it ornaments with various bright objects, but according to the *Oologist* our own red-shouldered hawk, though less renowned, has the same taste for the beautiful. The majority of red-shouldered hawks' nests are decorated with fresh leaves and flowers, the inclination for these ornaments seeming to increase as the nesting season advances. One nest is mentioned by the *Oologist* that was lined with the fresh green leaves of the "box-berry" (wintergreen) and the surrounding platform concealed beneath a profusion

of spruce twigs covered with their green needles. Entire plants of violets are also used, and the latter have been found in the nest so recently gathered that the flowers had not begun to droop.

ERRONEOUS BOTANY.—In a recent address Dr. W. F. Ganong called attention to the fact that when once an error gets into the text-books it is copied and passed along by other writers without hesitation. So great is our respect for the "authorities" that we seldom question a statement made with any show of erudition. If anyone doubts this he has but to get down his manual and see what the books say about the color of the ripe berries of the false Solomon's seal (*Smilacina racemosa*) and then compare this statement with the berries as they are. A few instances of this kind—and the botanical works contain many—ought to make all students a bit more hesitant in accepting facts encountered in botanical writings.

THE PLEASURES OF AN INVESTIGATOR.—Dr. E. L. Nichols, speaking before the Eastern Association of Physics Teachers at Boston recently, told of the pleasures of original investigation that may come to the student of physics. The physicists, however, have no monopoly of the pleasures of investigation. The botanical student has but to substitute botany for physics in the paragraph here quoted to make it applicable to his own line of work. "To be an investigator at all, one must have followed at least one line to the boundary which separates the known from the unknown and must interest himself not for a day, but daily year in and year out in finding trails leading outward into the wilderness. To pick out such a trail and blaze it a little way for the benefit of those who shall come after is to my mind what makes physics a live subject and the most fascinating pursuit in which a man can engage."

BIRDS AS BOTANISTS.—A British paper has recently commented upon the fact that in that country certain species of trees are likely to harbor peculiar kinds of birds. The oak is said to be the favorite with rooks and jays, and the beech with woodpeckers. In America many similar associations may be noted as the oriole and elm, the cat-bird and hawthorn, the yellow warbler and willow, the crow and the pine, etc. Such associations do not hold for all regions, unless the range of bird and tree are co-extensive, but it is conspicuous enough to be noticeable. In most cases this association is concerned with nest building, but it is difficult in some cases to understand why one tree is not as good as another for such purposes.

PROPAGATING SHRUBS.—Shrubs are best propagated from seeds. The seeds are slow to germinate, but if one has an out-of-the-way corner in the garden where the seeds may be planted as fast as one happens to collect them it will not be long before the corner yields annually a good number of choice seedlings. Such plants as send up new shoots from adventitious buds on the roots are easily multiplied in this way, while many others can be layered like grape-vines by bending down a branch, making a slanting cut half through it on the under side and covering the cut section with earth, allowing the tip of the branch to project above the surface. By autumn the branch will usually have produced roots from the edges of the cut and may now be severed from the parent plant and planted by itself.

THE BIOMONIST.—The United States Bureau of Plant Industry has a new official, or rather an old official, under a new title, this title being the Biomonomist. It may puzzle our younger readers to define just what a biomonomist is, and it will not be much help to look in the dictionaries, for the word is too rare to appear in many of them. Biometry, how-

ever, is defined as a rare term for physiology, and possibly a bionomist is a still rarer form of a plant physiologist. It is a pleasure to note that the Department of Agriculture is ever on the look-out for rarities. A great government like our own, however, cannot be too careful in the terms used to designate the heads of important divisions, and before adopting as final this new title of Bionomist, might carefully investigate the respective merits of Phytononist, Phytotomist, Phytopathologist and Phytophysiologist. There is no use in having common names for things when rare ones are so ornamental.

THE EFFECTS OF COLD ON PLANTS.—It is well known that freezing does not kill all kinds of plants, and many investigators have endeavored to discover why different species should behave so differently under the lowering of the temperature. For a long time it was thought that during cold weather the ice formed in the cells of plants and expanding ruptured the cell-walls, thus killing the cells. This, according to K. M. Wiegand, in the February *Plant World*, is an error. Unless the temperature is lowered very rapidly no ice usually forms in the cells. The ice occurs in the intercellular spaces and begins to form on the outside of the cells, drawing the water from the cells for the purpose. During extreme cold the water may be nearly all drawn from the cells, causing the cell walls to collapse. Upon the return of milder weather the ice gradually melts and the cells again absorb the water. The death of the cells, therefore, seems to be due more to the drying out of the cell in the process of freezing than to the mere chilling of the plant. Plants with cells that can endure this drying under frost are not killed by low temperatures. In some dryish winter buds the temperature must fall to zero or below before ice crystals begin to form, but other buds may be frozen solid at higher temperatures.



Editorial.

This month, in response to the general demand, we use a larger amount of Note and Comment and we take the occasion to again and more pointedly urge our readers to contribute to this department. In your rambles this spring and during the summer almost anything that is worth your attention in the field is worth writing about. Send such observations in by postal card while they are fresh in mind. Many botanizers keep a note-book in which are jotted down notes, queries, opinions and reflections about plants in general. We want similar notes. Hunt up your old notebooks and let us enjoy the things that make botany interesting to you.

* * *

After all, there is a charm about mere plant collecting that cannot be derived from any other branch of botany. All the delights of exploration and discovery await us in the nearest piece of wild land. We may have passed that way before, but the secrets of wood and field are not exhausted by one or by several such trips. And every recurring season brings new delights. For the beginner there are always new and strange plants to pique his curiosity and tantalize him until names for them are found; and for the older student, familiar with the names, there is the finding of the plants, each year anew, which is almost as good as the original discovery. But who that really loves the wild flowers will manifest his regard for them by gathering every one he can find? The fact is, the real lover of nature rarely comes back from an excursion laden with specimens. The individual with an armful of broken branches and drooping buds may tell you that she is an ardent lover of

nature, but you may be permitted to doubt it. Far better than the indiscriminate flower-gatherer is the herborizer with vasculum and press, but fortunately that relic of a former generation is fast going out of style. Very little can be said against the student with an herbarium collected by, himself, but the average individual who by exchanging aims to amass a large herbarium—as if mere size were a desideratum—might better be engaged in collecting postage stamps or tobacco tags.

* * *

If you have extensive grounds there is yet time to select for planting the wild shrubs and trees that prolong autumn into winter and attract the late birds by their berries. If your grounds are too small for shrubbery you may still transplant columbine, blue-bells, trilliums, asters, sunflowers, and many another to brighten the place until frost. If you have no grounds at all, the best advice that can be given you is to move. You cannot understand how much you are missing until you have poked about among the dead leaves in the borders of your own grounds and found the fresh, green spires of developing plants peeping above the mould early in spring, or watched the same tiny green spires wax strong and vigorous, unfurling at last their handsome flowers for your delight and comfort.

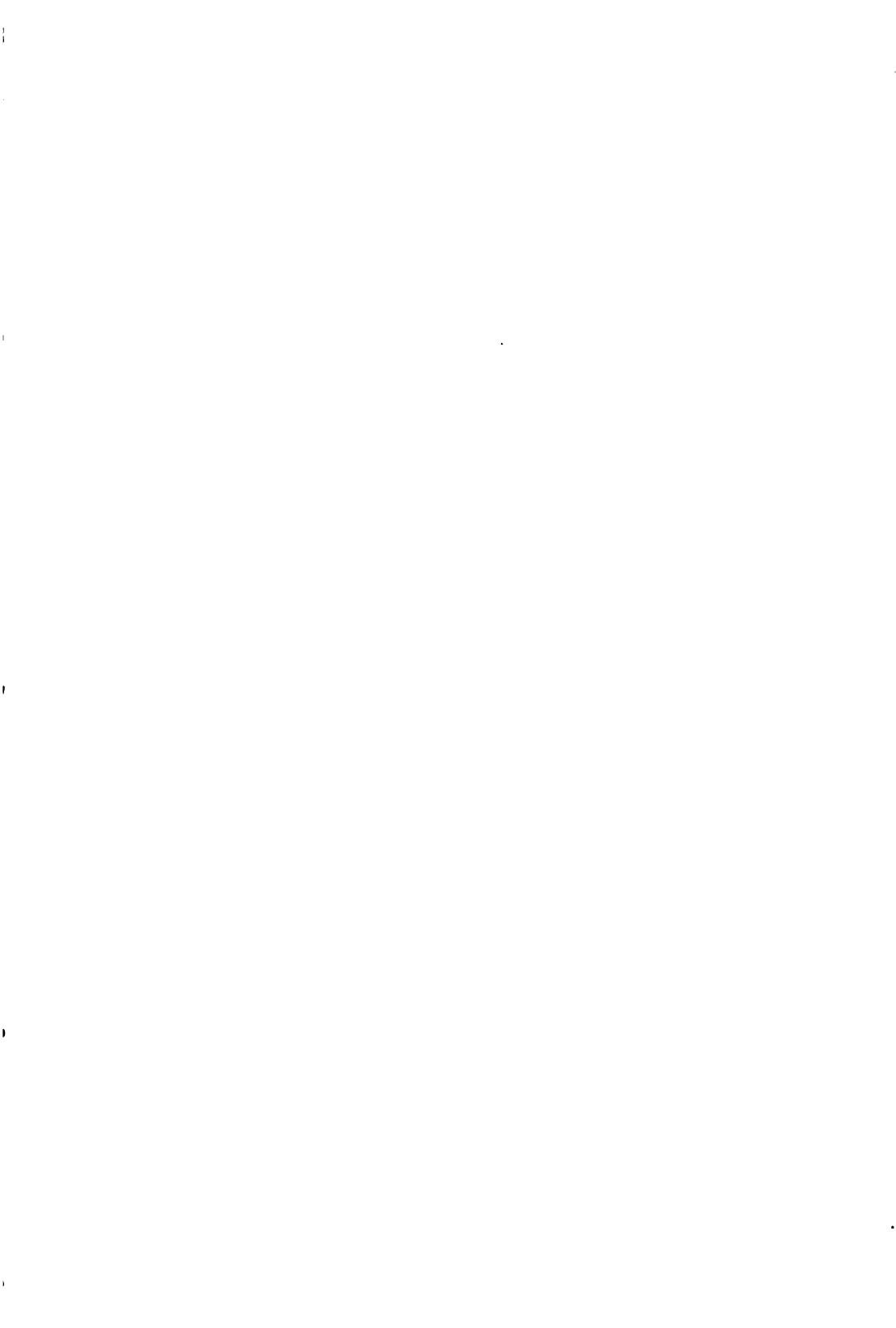
* * *

All flowers, even the so-called florist's flowers, are found wild somewhere or are descended from wild ancestry. Many of those offered by the plant dealer are most desirable for cultivation even by the botanist. Of course, the botanist will take care to select perennials and such perennials as have not been tampered with by the florist until stamens have been turned to leaves and the flowers bred into monstrosities. There is a long list to select from, and

among the best are the lilies, irises, columbines, phloxes, pinks, poppies, and bellworts. Many of these no doubt are growing in the nearest old-fashioned garden and crowns might be had for the asking.

BOOKS AND WRITERS.

Plants have their diseases no less than animals, and, as is the case of animals, a large number of these diseases are due to bacteria or fungi. The mushrooms, puff-balls and shelf-fungi feed for the most part on the dead or dying parts of plants, but there are some, even in these groups, that may be the cause of the death of trees. The great sources of disease in plants, however, are the rusts, smuts and mildews, which seize upon living plants and soon put an end to their existence. The great number of these pests makes a knowledge of how to combat them most essential to the farmers. Plant diseases annually cause losses amounting to millions in every state in the Union. To prevent some of these losses by its farmres the state of Minnesota has issued a fine volume, entitled "Minnesota Plant Diseases," by Dr. E. M. Freeman. It contains nearly five hundred octavo pages, and is divided into two parts, the first treating of the growth structure and reproduction of the fungus groups and the second dealing with the specific forms which cause plant diseases and the methods of exterminating them. More than two hundred excellent illustrations, most of them from photographs, are given and the book is a most desirable addition to the library of the fungus student, whether resident of Minnesota or not.





THE RECURVED TRILLIUM—*Trillium recurvatum*.

THE AMERICAN BOTANIST

VOL. X

JOLIET, ILL., MAY, 1908.

No. 5

OUR NATIVE LILIES.

IT is surprising to find how many flowers called lilies are not lilies when we come to examine the matter. If we assume, as seems proper that the true lilies belong to the family *Liliaceæ*, then the calla lily is not a lily, nor the water-lily, the Atamasco lily, the frog lily, the black-berry lily or the wood lilies. Day lilies, Easter lilies and meadow lilies are lilies in the sense that they belong to the lily family, but very few of these belong to the genus *Lilium*, to which in the narrower sense all lilies belong.

There are some fifty or more species of true lilies in the world, the great majority in the north temperate zone, where they completely encircle the earth. Usually there are not many species in any one locality, and their very distinctive habits make them among the most satisfactory of plants for the beginning botanist to identify. Best known of American lilies are probably the three common to the Northeastern states—at least most has been written about them. The earliest is the wild red, fire or Philadelphia lily (*Lilium Philadelphicum*), which must be looked for in June or July in open, broad-leaved forests, and bushy “slashings.” Its short stem, topped by one or two erect fire-red blossoms, will identify it at sight. From Ohio westward this species has a close relative called *Lilium umbellatum*. It has narrower leaves, alternate instead of verticillate on the stem. In the Southern states the common species gives place to the southern red lily (*L. Catesbaei*), which has narrow, appressed leaves and long-pointed perianth segments. The wild yellow lily (*L. Canadense*), which, as has been noted in this magazine, is as often red as yellow, is the common lily of

meadows and low grounds. Its flowers are turned toward the ground and there are usually several on a stem. It often grows thickly in meadows, though cut down year after year with the hay just as it is coming into flower. In the mountains of Virginia and North Carolina this has a resembling species in *Lilium Grayi*, named for the famous botanist. It may be distinguished from the common one by the fact that the perianth segments do not spread so widely. The turks-cap lily, well named *Lilium superbum*, is our finest eastern lily. It should be sought in low grounds and on the banks of streams. In favorable situations it sends up a gigantic stem, which may produce thirty or more blossoms. Commonly the flowers are not more than half a dozen in number. This species has some resemblance to the meadow lily, its flowers being of about the same color and also facing the earth, but it never need be confused with the meadow lily, because its perianth segments turn back, similar to those of the tiger-lily (*L. tigrinum*) of old-fashioned gardens. In fact, it is often called wild tiger-lily, from this resemblance. It, too, has a southern relative (*L. Carolinianum*), which is shorter, with fewer flowers, and leaves of a different shape. This ends the list of the true lilies. Mention may be made, however, of the day lily (*Hemerocallis fulva*), a common escape from old gardens in many parts of America. It may be known at once from the true lilies by the long flag-like leaves rising from a stem that remains underground. The two or three pale yellow-and-orange flowers rise on long stalks and last but a short time. Its relative, the lemon lily (*H. flava*), is still cultivated in gardens and occasionally is found as an escape. Its clear yellow blossoms distinguishes it from the commoner species which it otherwise closely resembles.

At times much depends upon the mere dictum of the taxonomist. Not so long ago the lily-of-the-valley and the

wood lilies, or trilliums, were considered to be in good standing as members of the lily family. Now, alas, their birthright has been taken from them and they have been grouped with others of like character in a separate family. To this group the lily-of-the-valley gives a name, but the trilliums are easily the most regal members of it, and will continue to be lilies in form and lilies in name to the common people in spite of the word of the botanist.

Like the members of the *Lilium* genus, the trilliums are well marked and easily identified. They are also widely distributed and far more numerous as to individuals than the lilies ever are. They come long before the true lilies do and have usually ceased blooming before their splendid cousins have become conspicuous. We have room here to mention the species of the Northeastern states only. The first to appear is the small white species (*Trillium nivale*), which inhabits the states north of the Ohio river. It often appears in March, and therefore is not to be confused with the great white trillium (*T. grandiflorum*). This is the largest and handsomest species of the genus, and as common as it is handsome. It is found in practically all the territory east of the Mississippi River and also in Canada. The pure-white flowers usually turn to a clear pink with age. All the trilliums are occasionally called wake-robin, but by common consent the title is allowed to *Trillium erectum*. How this species, which usually droops its blossoms toward or below the leaves, and practically never has them really erect, came to be named *erectum* is a botanical mystery not yet solved. It is an ill-scented blossom, though not without attractiveness, for the dull-red petals are of a color uncommon in our flora. To see the great white trillium and this plant growing together in the Eastern states, no one would think of mistaking them, and yet, in the middle west the red fades out of the latter's petals and they too take on a

pure-white hue, which is very puzzling to the novice. Curiously enough, with this adoption of the purer color the odor that characterizes the red flower largely disappears.

Two other trilliums that have red flowers are the species called *recurvatum* and *sessile*. They are not to be mistaken for *T. erectum* under any circumstances, for the flowers of these two are closely sessile, and the flowers of the other are stalked. Between themselves, the resemblance is so close that the beginner usually decides them to be forms of a single species. In *T. recurvatum*, however, the leaves are petioled and the sepals are reflexed; in *T. sessile* even the leaves are sessile and the sepals are erect.

The wake-robin is not the only trillium with nodding flowers. In *Trillium cernuum* the flowers are deflexed beneath the leaves, and being rather small are often passed under the impression that the plant is not in bloom. The petals are white, rather narrow, and rolled backward. The last of the eastern trilliums is *T. erythrocarpum*, readily separated from the others by means of the deep pink veins running lengthwise of the white petals. It loves the moist woodlands, but may often be found in open swamps.

A STUDY OF YEARS.

BY MRS. M. F. BRADSHAW.

THIS story I am going to tell you is a serial, not monthly, as stories usually come, but continuous for years, and not yet finished. In May, some years ago, we were botanizing for a week or two, at the beach, reveling in California wild flowers at their very best. The particular bit of coast where my summer home is located, has some unique characteristics. We all know that the mountains have one class of flowers, the valleys another, the beach another.

But here the mountains come down to the sea, and their steep slopes face south and southwest and there is never any frost. So we have the conditions mixed, and here we could reasonably expect to find some unusual and rare plants, and so it has proved, for we found one never before collected in the United States, though a known Lower California species—*Verbesina dessita*. And there are a number of others rarely seen and all most interesting studies. We had come to the place in our evolution as botanists where a new plant was an event.

There was an insignificant bunch of pale leaves near the ground that we passed by at first, because we saw no flowers with it, and there were so many, many flowers, so many kinds, so many colors, such lavish display everywhere, that how could we be attracted at first by a few lowly, rather yellow, and worn-looking leaves? But inevitably the day came when we brought in the plant and gave it careful study. The leaves were growing on a running stock about one and a half inches below ground; they were about the size and much the shape of violet leaves, which set us first to studying the violet family. There were growing from the tufts of leaves little buds, as we thought, just appearing and nearly sessile; a lens, however, revealed the fact that our buds were seed capsules, but we were not botanists enough to determine what they were. This mysterious method of bearing seed below ground was something new, and so we sent specimens of the plant to a local botanist, who had always helped us out of previous difficulties, and who is an authority on Southern California flora. He wrote back for more material, but owing to his having forgotten temporarily my name, I never got the two letters he sent and a third one came too late for that season. Meantime, we had gone to the beach again the last of June and found our little plant had disappeared. But digging in the place

we thought it had been, we found some of it below ground, where it was waiting dormant for its next year's short lease of life in the world above. Carefully digging it up we sent it to our California friend and also to Dr. Robinson, of Harvard. Dr. Robinson wrote us it was *Dichondra repens*, of the Convolvulus family. Looking up this species in the Botany of California, we found that it has a yellow corolla, but no mention of an underground habit of seed-making. Now, so far, we had not found any corolla, and doubted our plant's having any. In August we again searched out the plant, no vestige of it remaining above ground. The seeds this time were matured and we gathered some for our seed collection, less than a dozen. There was no doubt of the Convolvulus now, but the plant's original ways were still to be studied, and we resolved to see it every month of the next year. So in the meantime all available literature on cleistogamous plants was read, and we found that a few plants flower above ground and then bend down and bury their heads to mature their seeds. Some have no real flower, but turn from buds to seed capsules. Not one, however, but at some time was living above ground. Now, our plant grew its seed below ground on stems from an eighth to a fourth of an inch long, and so never coming within an inch of the surface.

Beginning the next spring as early as seemed reasonable—in March—we found our plant just peeping above ground, with no signs of flowers, so now only April remained in which it might show its corolla to the world if it ever had any. April found me just trying to recover from an illness that left a bad cough; so to the mountains I was sent, and must wait one whole year to read the April installment of my story. But the years slip away, and when another April came my interest in the little *Dichondra* was as fresh as ever, and to the beach we went, solely to look it up

and resume our acquaintance. When I mention it is twenty-five miles to the cottage—a remote, isolated place, and a full five miles farther to the place where the plant grew, and no way to get there but to drive; a shut-up cottage to open and nothing to eat except what we took from home—well, you can credit us with some genuine interest in nature and her wondrous ways.

This time there was a corolla, a microscopic thing, and crimson instead of yellow. Now, the color of the flower would scarcely be reason for throwing over the specific name given in the Botany of California, but why does not this work mention the extraordinary method of growing its seed? Since I have never read of this characteristic in any work on plants, I would like to know if any other known plant has it, and if anyone has found such a plant, where I can find an account of it.

Orange, Cal.

THE CHOCOLATE PLANT.

BY DR. WM. WHITMAN BAILEY.

THE scientific name of the chocolate plant was one of those happy inspirations that much too infrequently attend the recognition of a new genus. *Theobroma*, food of the gods—it has all the requirements of a good title; it is sonorous, euphonious, poetical, designative, suggestive, truthful. One of those few plants of beneficent quality, without which it would seem that its original possessors could in no way dispense, it had but to be discovered by the European, to, like tobacco, make itself necessary to the whole world. "Breathes there the man with soul so dead" to choice flavors that he does not appreciate, and at times ever yearn for chocolate? What a happy blending or intermarriage of two tropical luxuries when someone learned—

or did it come by intuition—to bring vanilla and chocolate together in the same divine composition?

Much has been written or suggested about the true food of the gods, and wild guesses made as to the nature of nectar and ambrosia. We strongly suspect that the divinities really had very indifferent victuals and drink. What was metheglia to regal, soul-gratifying chocolate? Funny! In those old classic times the all-knowing gods kenned not chocolate. It belonged to a new world, and to a more primitive set of divinities and heroes!

The chocolate plant belongs to the small family Sterculiaceæ, not remote from mallows, and to which we also attribute the pretty hot-house shrub, now old-fashioned and vanishing, with honey-yellow flowers, the *Mahernia vermicillata*. As implied above, it is strictly American, and found only in the tropics.

There are eight or ten species of *Theobroma*, but the well-known food plant is *T. Cacao*. It has naught to do with *Cocos*, the cocoa-nut, which is a palm, nor with Coca, the familiar anæsthetic drug derived from *Erythroxylon*. It is very unfortunate that the names of these plants, so unlike in relationship and properties, should be so similar.

The chocolate tree is a small one, less than twenty feet high, as a rule, with large, oblong, taper-pointed leaves. There is a pretty contrast in the flowers, which are borne in clusters, between the rose-colored calyx and yellowish corolla. The ovary ripens into a sort of pod, of which every portion is of economic use as a food or drink. The true chocolate is prepared from the seeds. "When ripe the fruits turn yellow outside and they are then gathered by hand, afterwards split open, and the seeds removed. These are then made to undergo a slight amount of fermentation, or sweating, lasting from one to two days, for the purpose of developing their color, and are afterwards exposed to the

sun daily for about three weeks, or until they are thoroughly dry, when they are packed for exportation."

Not only is chocolate delicious to the taste of most people, but it is nutritious, refreshing and devoid of any noxious or stimulating alkaloids, unlike coffee or tea, which are partaken of as infusions; chocolate (unless in the case of the inferior drink called "shells") is taken directly into the stomach and acts as food.

Brown University, Providence, R. I.

HOW TO BEGIN BOTANY.

BY WILLARD N. CLUTE.

THE student who is taking up botany at present can scarcely realize the difficulties that presented themselves to the plant student fifteen or twenty years ago. Then the names of our familiar wild flowers could not be learned by comparing the plant with its picture in a book, for there were no books. Of course, there were technical manuals earlier than that, but it required considerable study before the knowledge locked up in these volumes became intelligible to the ordinary mortal. It is small wonder that botanists in those days were exceedingly rare. Such botanists as there were, however, were usually deeply learned in their subject, for no one took up the study of plants at that time unless he was urged on by his love of the science.

The past few years have witnessed the production of a vast array of books designed to smooth the way for the plant student, until the merest novice may know the names of the showy wildflowers. His only perplexity is likely to be not where to find a book devoted to plants, but which book of the many to select. The following observations are designed to assist the novice in selecting.

A knowledge of the names of plants is far from constituting a botanical education, but it is usually the first step in that direction. There are two ways of obtaining these names: one by a careful study of botanical terms and the relation of the parts of the plant to each other, after which any native plant may be easily run down by means of the keys in the manual; the other by the more or less artificial schemes in the popular handbooks, such as the identification of flowers on the basis of color, habitat, etc. Since this latter method appeals most strongly to the beginner, we will take it up first.

In my opinion, if one wishes to know the names of our showy wildflowers only, Dana's "How to Know the Wild-flowers" (\$2.16) is still far ahead of all competitors in the Northeastern States and Canada. On the west coast Parsons' "Wildflowers of California" (\$2.00) is a most desirable book. For the Gulf States, Lounsberry's "Southern Wildflowers and Trees" (\$3.71), though having various defects, is the only popular work. There are several other books good for use in the Eastern States, among which may be mentioned Matthews' "Field-Book of American Wild-flowers" (\$1.87) and Lounsberry's "Guide to the Wild-flowers" (\$1.92). All these are profusely illustrated, and when one is really interested in the wildflowers, all are likely to find their way to his book-shelves in time. Each treats the subject somewhat differently, so that one may gain valuable help from this multitude of counselors.

It is to be regretted that so many people lose interest in the plants as soon as they learn their names. Possibly this is due in part to the popular handbooks themselves, which give prominence only to the plants with conspicuous flowers and often ignore the others entirely. When one has become pretty familiar with his popular books he is frequently exasperated to find that they do not contain a mention of

numerous plants that grow in his region. At this point he is ripe for the botanical manual, which contains descriptions of all the plants even to the most insignificant weeds. It is a satisfaction in studying over a new plant to feel that somewhere in your book the plant is properly recorded. The botanical manuals are cast on strictly scientific lines, and the terms are exact and therefore technical, but no one need think himself much of a botanist until he can handle such a manual with facility. "Gray's Manual" (\$1.75) is without doubt the best for the Northeastern States, and Chapman's "Flora of the Southern States" (\$4.18) is best for the Gulf States. In the region covered by Gray's manual there is another called familiarly "Britton's Manual" (\$2.40), but the species are so finely subdivided that only the experienced botanist will find it useful. A similar volume in the Southern States, Small's "Southern Flora" (\$4.00), is much too complicated for the beginner. Coulter's "Botany of the Rocky Mountains" (\$1.75) and Coulter and Gray's "Text-Book of Western Botany" (\$2.25) are the principal books in their region.

The trees are included in all botanical manuals and in most of the popular handbooks, but there is such an individuality about them that various books devoted exclusively to them have been issued. To get the best, I would advise Keeler's "Our Native Trees" (\$2.15), and as a companion volume the same author's "Our Northern Shrubs" (\$2.16). Some might be inclined to select Lounsberry's "Guide to the Trees" (\$1.92) because of the colored plates, but Keeler's books have a greater amount of information. For a book to continue the study of shrubs into late autumn, Peterson's "How to Know Wild Fruits" (\$1.62) will be useful, and in winter Huntington's "Studies of Trees in Winter" (\$2.25) will be excellent. Newhall's "Trees of Northeast-

ern America" (\$1.75) is older than any of the foregoing, but is still useful.

After the flowering plants become well known one often has a desire to specialize among the lower plants. For a single book on ferns, select Clute's "Our Ferns in Their Haunts" (\$2.15); for the next best Parson's "How to Know the Ferns" (\$1.63). Water's "Ferns" (\$3.30) is also desirable for reference. In fern allies there is but one book, "Clute's Fern Allies of North America" (\$2.00). All these are popular handbooks for naming the plants. For a technical book select Underwood's "Our Native Ferns" (\$1.08). In mosses, Grout's "Mosses With a Hand Lens" (\$1.75) is most desirable. Of the various books on mushrooms, Atkinson's "Mushrooms, Edible and Poisonous" (\$3.00) and Marshall's "Mushroom Book" (\$4.00) are about evenly matched. Marshall's book is probably best for the beginner, Atkinson's being the more technical. Both are well illustrated. For a text-book covering the whole field of the fungi, Underwood's "Moulds, Mildews and Mushrooms" (\$1.60) may be selected. Schneider's "Guide to the Study of Lichens" (\$2.50) and Sargent's "Lichenology for Beginners" (50c) are both excellent.

All the books thus far mentioned may be listed as so many helps to becoming acquainted with the plants, but many of the most enduring pleasures of botany do not appear until the names of the plants are known. Not until one has a general knowledge of plants and plant relationships can he understand and enjoy the best literature of the subject. Then such books as Dana's "According to Season" (\$1.92), Wright's "Flowers and Ferns in Their Haunts" (\$2.65), Flint's "Garden of Simples" (\$1.62) and many others will have a new charm. As one extends his acquaintance with the plants more and more of such books find their way to his library until all have a place.

The young botanizer, long before he has reached the stage where anything more than a guide to the names of the flowers is necessary, usually wants to make a collection. The best book on this subject is probably Clute's "Making of an Herbarium" (25c). Bailey's "Botanizing" (75c) is somewhat larger and equally desirable. Both these books give information about driers, presses, etc., but it may be added here that the cheapest and most useful plant-press is made from two sheets of stout binder's-board, to be obtained at the nearest book-bindery, held together by two straps. The best driers may be cut from deadening felt such as builders use and which may be obtained at most hardware or wholesale paper houses. The ordinary trowel, sold for 5 or 10 cents is not good enough for most work. A Cleves' angle trowel, costing from 25 to 40 cents, according to size, is the best to be had anywhere. For collecting living plants to study while fresh, one needs a vasculum of tin. Any tin box that will keep the plants moist, but not wet, will answer. A regular vasculum may be bought for 75 cents and upward, or the nearest tinsmith can make one to order from a description or a picture. It is a mistake for the field botanist to load himself down with paraphernalia. His favorite handbook or manual should always go with him to the field, however. It is astonishing to see how much easier plants are identified in the field than they are when examined at home. A good lens is also an absolute necessity to the plant student. The cheapest may be purchased for 15 to 25 cents, and the most expensive costs \$5 or more. After trying a large number of varying excellence we have come to favor the lenses sold by Williams, Brown & Earle, at \$1.25 and advertised in this journal. The Coddington lenses, heretofore the cheapest acromatic lenses, cost from \$1.50 upward, and are more bulky, without an increase in the magnifying power.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

USEFUL MOSQUITOES.—There is probably very little to be said in favor of the pestiferous mosquito, but it may possibly be set down to its credit that it occasionally transports the pollina of the green orchis (*Habenaria hyperborea*) from flower to flower.

FERTILIZATION IN THE GINGKO.—The gingko, or Chinese maiden hair tree (*Gingko biloba*), which is now often planted for shade in this country, is a remarkable tree in many ways. Although so closely related to the pines as to often be placed in the same order, the leaves are flat and expanded, instead of needle-shaped, and veined exactly like those of the maiden-hair fern. The fruits are not cones, but look like yellow plums, and are manifestly nearer the structure of the fruits of the yew, juniper and similar "conifers." In ordinary plants after pollination, the pollen tube grows down through the pistil until its contents fuse with those of the embryo-sac before a seed can result. In the gingko, on the contrary, the fruit may mature and finally drop from the tree before this fusing of pollen tube and embryo-sac contents has been accomplished.

THE VALUE OF COMMON OBJECTS.—Why should men be sending off to mid-Africa for plants and shrubs to decorate their homes, wasting their time and money in trying

to keep them up in their unnatural surroundings when nearly every roadside and woodland contains many of our own plants that are fully equal in beauty and vastly better fitted for life here, but are passed by under the name of weeds? Why should many of our invaluable bits of natural scenery be continually torn up and "improved" for financial purposes? Why should it practically require an armed guard to prevent one of our stateliest and most venerable objects of national pride, the giant sequoias, in California, from being splintered into pickets for grape arbors? In most cases it is because the actual value of the country and of its common familiar objects is not known. Our education leads away from the woods and fields and waters, the atmosphere of our main occupation, instead of toward them.—*Nature Study Review*.

THE LIFE-SPAN OF PLANTS.—The big trees of California are without doubt, the very oldest vegetables on our planet. The sapling days of many of them date from before the Christian era. There are probably few, if any, other trees that under the most favorable circumstances would live as long. Plants have their old age and death as well as animals. It is a curious fact in this connection, that the life of many sorts of short-lived plants may be continued indefinitely by budding, grafting or layering. Some of our most desirable cultivated fruits have arisen from a single sport whose good qualities have been perpetuated by such means. Thus all the trees of a certain kind are but so many parts of the original sport. In this way, though the individual tree may attain maturity and finally die, the life of the original is still carried by new grafts, and if there should happen to be someone at hand to continue the process by buds or scions, there seems to be no reason why the strain should not live forever.

DISTRIBUTION OF THE PIPSISSEWA.—Our common pipsissewa (*Chimaphila umbellata*) encircles the world in the north temperate zone, skipping only an occasional locality. Northward it extends nearly to the Arctic circle. Its relative, the spotted wintergreen (*C. maculata*), which, by the way, can hardly be properly described as spotted, is a strictly American plant with a much more restricted range, even in America. While this second species is absent from so much of the territory inhabited by *C. umbellata*, it is interesting to observe that in Japan a third species, *C. Japonica*, maintains much the same relation to the widespread species in Japan as *C. maculata* does here.

VIVIPAROUS FERNS.—Several species of ferns in our flora occasionally bear young plants upon their fronds. The best known of these is the walking fern (*Camptosorus rhizophyllus*), which normally bears a plantlet at the tip of each frond. A common greenhouse fern, *Asplenium bulbiferum*, produces numerous plantlets on various parts of the frond, and another species, *Polystichum angulare*, bears a row of close-set plants along the main stalk or rachis. The latest addition to this list is the bulb-bearing cystopteris (*Cystopteris bulbifera*), which in Vermont, recently developed a frond with young plants. This species is well known to produce bulblets from which, after they have fallen to the earth, young plants grow, but this seems to be the first recorded occurrence of young plants on the living frond. The specimen is figured in the October *Fern Bulletin*.

INTRODUCED WEEDS.—It is probable that few of us have any adequate idea of the number of introduced weeds in our flora. In a recent lecture to the Massachusetts Horticultural Society, M. L. Fernald stated that more than 600 species of plants have been introduced into the flora of New England. These introductions have had several ways of

entrance. Some have come by way of the railway; others as ballast in ships from foreign ports, while still others arrived among seeds for field and garden, clinging to the coats of domestic animals, etc. Along one river in Connecticut the origin of great numbers of new weeds was traced to a rubber factory using old rubber shoes. In the linings of these shoes, which were thrown out, great numbers of weed seeds were hidden. We have sent few weeds to the Old World to balance accounts, but occasionally something is done to make the scores nearer even. Our common ditch moss (*Elodea*), which at home is a mild and inoffensive plant, has completely choked up many British streams and become a fair offset to the damage done by the water-cress (*Nasturtium*) in this country.

HABITAT OF THE LADY'S SLIPPER.—There are many curious things about the orchids besides their flowers and methods of pollination. It has been pretty well settled that some species may rest for a year or more without showing a sign of foliage above ground. Another interesting circumstance connected with these plants is the habitats selected by them. In some regions the pink lady's-slipper (*Cypripedium acaule*) is found only in swamps in the shade of hemlocks and other conifers; in others the plants grow on dryish hillsides. In the last-named localities the plants seem to delight in a moldering log, and are usually found in colonies along it. After the log has entirely disappeared one may often decide in which direction it extended, by the arrangement of the orchid colony. The yellow lady's-slippers (*C. pubescens* and *C. parviflorum*) are usually found on dryish hillsides, but they, too, may occasionally inhabit the swamps. The yellow species will thrive under cultivation, but the pink one usually dies after a year or two, which fact, taken in connection with its preference for old logs, seems to indicate that it is a partial saprophyte.

Editorial.

The long-delayed November and December numbers of this magazine have at last been mailed to all subscribers to the magazine for 1905. If any who are entitled to the numbers did not receive them we shall be glad to send others as soon as notified. In this connection we must thank our subscribers for their patience with us while overtaking our dates. We have not lost half a dozen subscribers on account of the delays in issuing, and now that we are again on time, we anticipate a steady increase in the subscription list.

* * *

Four years ago a small nature-study department was introduced into the program of the Connecticut Chautauqua Assembly. From this tentative beginning the department has grown to be among the most important upon the regular program. This year there will be a series of talks on birds, trees, flowers, ferns, insects, fungi, etc., each one of which is followed by a trip afield for the study and collection of specimens. The assembly is located in a large woodland in the midst of a piece of very attractive country for the nature student, and will be found to be a most delightful place to spend part of the summer vacation. Although located in the woods, the tents so conspicuous in many summer gatherings are entirely absent. All the buildings are modern and substantial. This year the session extends from July 12th to 25th. Folders giving further information about rates, other lectures, etc. may be obtained by addressing the Connecticut Chautauqua Association, 411 Windsor avenue, Hartford, Conn. The nature study work at the assembly will be under the direction of the editor of this magazine,

who will be glad to meet any of his readers who may chance to attend.

* * *

The other day the editor of this magazine had an agreeable surprise, which he here purposes to pass along to his readers. Having occasion to order some books from D. Appleton & Co., of New York, he included in the order a copy of "The Plant World." It is probably unnecessary to add that the "Plant World" meant is not the magazine of that name, but the book by Frank Vincent, with the same title. We expected some treatise on the vegetable kingdom by a single writer, but were much pleased to find a series of fifty selections about plants from the master botanists of the world, such as Haeckel, Hartwig, Gage, M. C. Cooke, etc. These selections cover a wide range of subjects, from pitcher plants and pumpkins to palms, ferns, sea-weeds and the baobab. The book was issued eight years ago, and possibly most of our readers have seen it, but if not, it strikes us that all who like the general run of the articles appearing in the AMERICAN BOTANIST will take pleasure in owning this book, which contains 225 pages and costs but 65 cents. This notice is not a book review, and is printed here solely because we think our readers will enjoy this excellent little volume.

* * *

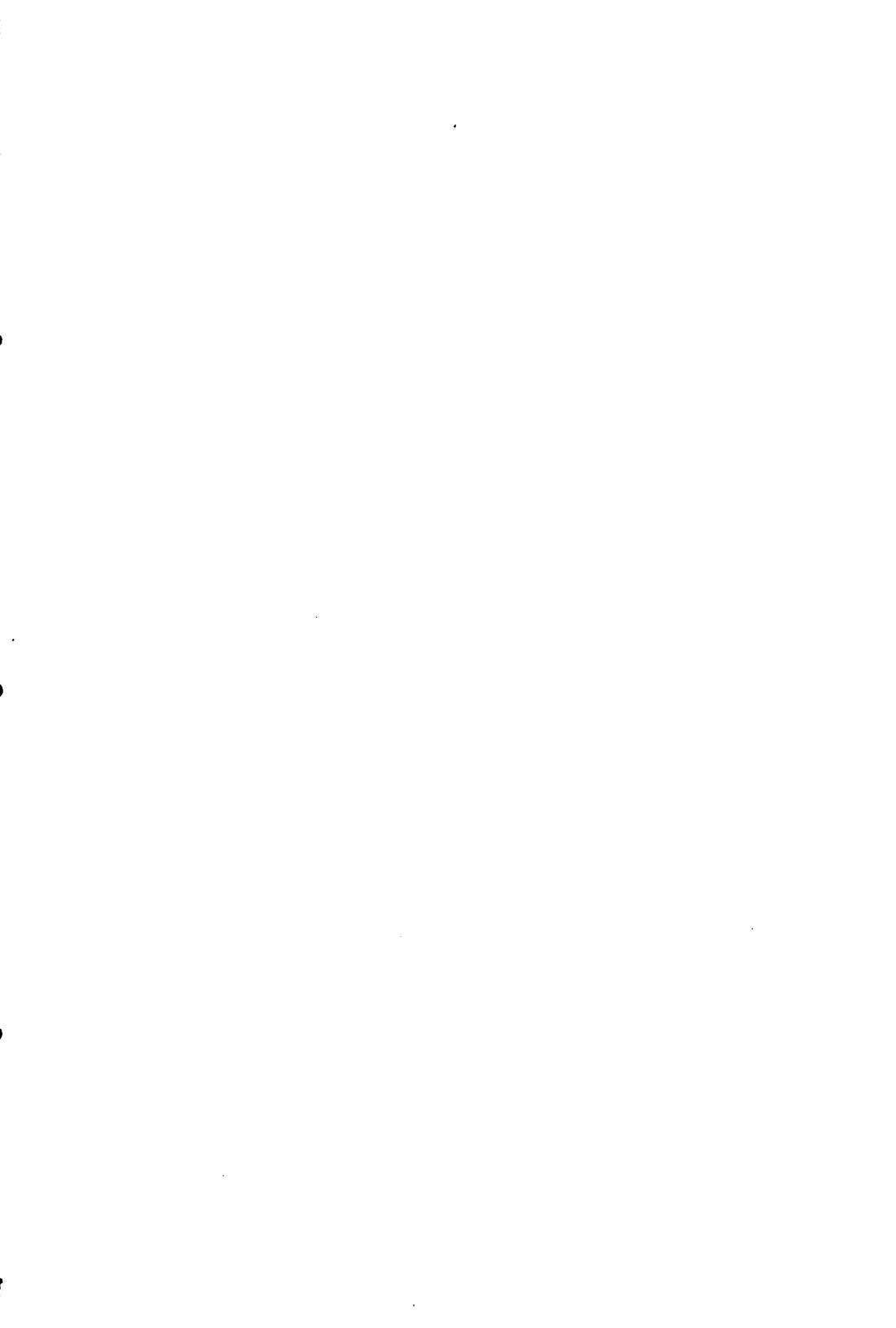
At the end of the present school year, Dr. William Whitman Bailey, who has so long held the chair of botany at Brown University, will resign his office into the hands of his assistant, Prof. J. Franklin Collins. Dr. Bailey is among the best-known of the older group of botanists and has enjoyed the friendship of nearly all the great men in his line of the generation that is passing. He is by no means an old man and while his health does not permit of the activities of school life we hope to have him with us for many years to come. May he live until the nomenclature question is settled to the satisfaction of everybody!

BOOKS AND WRITERS.

The *Gardening World*, of London, has issued two more numbers in its series of "Handbooks," these latter treating of "Dahlias" and "Annuals and Biennials." These handbooks are apparently most useful to British growers, and a similar departure by some of the gardening publications on this side ought to take.

The number of our wild plants that have medicinal properties is truly surprising. A list of these compiled by Alice Henkel has recently been issued by the United States Department of Agriculture. They are arranged alphabetically under the generic names accepted by radical botanists and the best-known common names are also given. The parts of the plant used are noted, and the distribution of each species is recorded. Not all the plants are officinal, but the officinal are carefully distinguished from the non-officinal. It is to be regretted that the nomenclature of this list, like the nomenclature of the latest edition of the United States Pharmacopoeia, follows the *Hepatica Hepatica*, *Benzoin Benzoin*, foolishness showing how much damage an ill-advised scientist can do when unhampered.

MANDRAKE IN DEMAND.—It is believed that nearly 2,000,000 pounds of mandrake (*Podophyllum peltatum*) rootstock comes to market each year, most of it likely to appear again later in the guise of liver pills. Where the vast amount of the drug comes from is a mystery. The dried rootstock brings less than 10 cents a pound, and the price is not much of a temptation to dig it up.



THE HART'S-TONGUE FERN AT HOME.



THE AMERICAN BOTANIST

VOL. X

JOLIET, ILL., JUNE, 1808.

No. 6

NAMING THE FERNS WITHOUT A BOOK.

BY WILLARD N. CLUTE.

ALL ferns look alike to the novice. Those of us who, by long association with these handsomest of plants, have arrived at a stage where we can recognize most of the common species at sight, whether in fruit or not, can look back to a time when the most conspicuous species was a puzzle and though in full fruit, was not easily identified by any book in our possession. With the increase in the study, books designed to help in naming the ferns have multiplied until even the novice rarely goes astray in his identifications. With a good book fern collecting becomes a pleasure instead of a serious study, but without a book the great majority of the species are easily recognized. He who does not have to hunt down his species through the mazes of a technical key, misdirected here and there by unfamiliar or half-understood terms, gains somewhat in the mere matter of time, but he misses something of that elation with which after a long chase we older ones pounced upon our quarry. We are not yet ready to give up the technical manuals entirely—they are still invaluable for settling questions of minute differences—and the popular books are almost indispensable, but much, as we have said, can be learned without one.

It need hardly be said, probably, that the spores of ferns are usually borne on the under side of the leaves, where the fruiting parts form curious dots of various shapes and sizes, and that the form and arrangement of these fruiting parts serve as a convenient means of identifying the species. In our study without a book, however, it will often be found

easier to seize upon some prominent character that so plainly marks our species that it would seem as if nobody could mistake it.

Let us begin with some of these unique species. Unless one lives in New Jersey, Newfoundland or Cape Breton and Nova Scotia he need not expect to find the curly grass (*Schizaea pusilla*) and even if he does live in any of these places he must be prepared to search the cranberry bogs with his nose close to the ground for days and perhaps years before he finds it. The best way is to get a better informed friend to point it out. Then it can be found again easily if it occurs at all. All along the Atlantic coast from New Hampshire to Florida one may expect to find our only climbing fern (*Lygodium palmatum*). It is not found in every locality, however. One must search the bushy borders of swamps where he may be fortunate enough to discover the slender stems with rounded palmate leaflets twining about the stalks of other plants to the height of two or three feet. The Hart's-tongue (*Scolopendrium vulgare*) of which we present a picture in this issue, is too rare to be counted upon unless one lives in Central New York or the country east of Lake Huron. Our illustration is from a plant in its native haunts in Central New York and was photographed by Mr. H. E. Ransier. The fronds are unmistakable being a foot or more long and two or three inches wide with entire margins. The walking fern (*Camptosorus rhizophyllus*) is possibly as much sought for by the beginner as any species we could name. The title of walking fern has a peculiar charm and one always remembers his first sight of the curious fronds. Fortunately this fern is not so rare as the books would have it. Go to the nearest deep, shady woodland, search the moist, but not wet rocks, and when you find a plant with dark green leaves, heart-shaped at base and not half an inch wide and tapering gradually to a

slender apex, rejoice. The whole plant may sometimes be covered by one hand. There is nothing else, so far as I know that looks much like it.

Leaving the rarities, let us glance at some of the common things, beginning with the very commonest. If you have ever seen a swamp in spring with ferns growing waist high in it, and if in the circles of fronds there appeared here and there brown, club-shaped spikes, know that you have seen the cinnamon fern (*Osmunda cinnamomea*). No other fern can be mistaken for it when thus in fruit, but unless one looks sharp he may pass unnoticed its nearest relative, the interrupted fern (*O. claytoniana*). Its fruiting frond is not wholly brown, but has green leaflets at both base and apex. Several pairs of the middle leaflets are turned to fruiting bodies and by this sign, alone, you shall know it. The royal fern or flowering fern (*Osmunda regalis*) is another of this family, but in this only the upper part of the frond bears fruit. From its appearance it is called the flowering fern though no ferns, of course, ever bear flowers. No other fern fruits in this way. Look for it in swamps and wet woodlands.

There are several ferns with triangular fronds that for our purpose may well be classed together, though neither Nature nor the scientist would subscribe to such an arrangement. In dryish woodlands and along roadsides one is sure to find the largest of these triangular species. It belongs to the bracken (*Pteris aquilina*) so familiar to readers of English song and story. Often the fronds are three feet across. The fruit is borne in a narrow line on the borders of the leaflets. In moist woods occurs another triangular species. This is the rattlesnake fern (*Botrychium Virginianum*). It is a rather fleshy species, and may further be distinguished from the bracken by producing its fruit in a slender brown cluster that rises erect from

the base of the green triangle. The rattlesnake fern fruits in early summer. In September and October another Botrychium, the grape fern (*B. ternatum*) appears. Its time of fruiting distinguishes it from all others but its much smaller size and its habitat in pastures and open woods will help. It may be said in passing that the species makers have operated upon this plant until they have described a large number of varieties of no especial importance. Still another triangular species is the little oak fern (*Phegopteris Dryopteris*). It is only a few inches high and delights in deep moist woods. The yellow-green fronds are like three tiny fronds in one and bear their fruits on the under-side of the leaf in the shape of tiny dots. It cannot be mistaken for any of the others. In dryish woods is another member of this family called the broad beech fern (*P. hexagonoptera*) and on wet rocks may be found still another, the common beech fern (*P. polypodioides*). These two latter are not easily confused with any of the others, but they resemble each other so much that one must resort to the books to make sure of his identification.

All these common species are deciduous except the grape fern which keeps its one fleshy leaf until time for a new one to start. We do not lack for evergreen species among common ferns, however. One that every rambler in rocky woodlands has seen is the Christmas fern (*Polystichum acrostichoides*). Its fronds are dark green and leathery and a foot or more long. The leaflets are eared on the upper side at base, and when the fruiting fronds appear they bear the fruit on the upper half of the frond which is abruptly narrowed for the purpose. No other species has this peculiarity. While in the rocky woods look for the polypody (*Polypodium vulgare*). It is nearly certain to be present. Examine the tops of shaded ledges, the crests of boulders and other dryish sterile places. The

plant looks like the Christmas fern but is smaller, lacks the eared leaflets, the narrowed apex and its fruit is found in rather large roundish dots on the under surface. On such rocks one may find the common bladder fern (*Cystopteris fragilis*) and its ally the bulb-bearing bladder fern (*C. bulbifera*). The woodsias, too, especially *Woodsia obtusa* and the rusty woodsia (*W. Ilvensis*) may occur, but it is not easy to describe them so that the novice will recognize them. All are small or medium-sized ferns. *Cystopteris fragilis* is commonest. *C. bulbifera* thrives only on moist rocks while *Woodsia Ilvensis* almost insists on the tops of the driest rocks, often in full sunshine.

In almost every swamp one may find the sensitive fern (*Onoclea sensibilis*) with coarse and unfern-like foliage that is not at all sensitive to ordinary stimuli. Its fruit resembles small green or dark brown berries borne in compound spikes; they appear late in the year and often remain erect above the snow all winter. They are familiar objects to the rambler in winter. The ostrich fern (*Struthiopteris Germanica*) is a near relative. It has foliage like that of the cinnamon fern, but the fruit is produced late in the year and is more like that of the sensitive fern. Another fern that resembles the cinnamon fern is the common woodwardia or chain fern (*Woodwardia Virginica*). Its fronds do not grow in circles, however, and the fruit is borne in oblong dots on the under-side of the fronds. The sterile fronds of the narrow woodwardia (*W. Angustifolia*) resemble those of the sensitive fern but the fruit is borne on the under-side of the fronds instead of in berry-like spikes.

There is no use in describing the maidenhair (*Adiantum pedatum*) for everybody knows it, nor in describing the various members of the *Nephrodium* and *Asplenium* genera for they cannot be certainly separated without a book. It may be said, however, that the *Aspleniums* are

mostly rock ferns and the *Nephrodiums* are so frequently found in woods as to be called wood ferns. In sandy or rocky woods one may find the ebony spleenwort (*Asplenium ebeneum*) and on shaded ledges the green rosettes of the maidenhair spleenwort (*A. trichomanes*) the silvery spleenwort (*Athyrium acrostichoides*) must be sought along woodland rills while the lady fern (*A. filix-foemina*) is everywhere. Among other rock spleenworts are several of our rarest species.

The commonest wood fern is the marginal shield fern (*Nephrodium marginale*) to be found in nearly all rocky woods. In dry woods look for the New York fern (*N. Noveboracense*) and in all swamps a slender species will prove to be the marsh fern (*N. thelypteris*). That tall finely dissected fern in rocky woods is the spinulose fern (*N. spinulosum*) which has many puzzling disguises. Goldie's fern (*N. Goldieanum*) is a large fern like *N. marginale*. It is not abundant, and therefore all the more desirable.

Space does not admit of a mention of all our species, nor all of even the common ones, but those mentioned may easily be identified this summer. As for the rest—it is good to have here and there a plant to pique the curiosity. With the mention of the boulder fern (*Dicksonia pilosiuscula*), a fragrant species in all elevated regions, I am done except to wish the novice fern student much pleasure and profit in naming his specimens.

MEADOW FLOWERS.

BY DR. WM. WHITMAN BAILEY.

THE tropics may boast of palms, bamboos, swinging vines which hang like cordage from the forest trees, and bizarre forms of orchids and bromeliads. We

acknowledge the grandeur and beauty of all these, but still we think no southern forest can surpass, or even vie with an apple or peach orchard in full bloom; the woods when gay with dogwood, or splendid with mountain laurel. Then, above all, we have our meadows, billowy with grasses or bespangled with buttercups and daisies.

We find ourselves often endowing plants with human attributes, and each has its character and its special friendships. This idea formerly regarded as essentially poetical, now meets with scientific recognition in such terms as "plant communities" and a student in collecting is asked to note the associations which plants form with each other.

In early summer the meadows are yellow with bulbous buttercup—at least in New England. By the time this passes away, the ox-eye daisy will spread its stars over the lawn—so very beautiful if they were not so common. The "Marguerites" or "pearls" are ever associated with fortune telling—and it is not alone poor Gretchen who plucks their prophecying rays. The English daisy—"the wee crimson-tipped flower" of Burns, is a very different plant, and in America seen only in cultivation in lawns or in garden beds.

At this season we often see a red flush over the meadows. It is caused by the sheep-sorrel. The individual plants have little to commend them, but from a distance, when they wave with the grasses they give to this red sea an appearance of changeable silk.

The red clover is protruding its ruddy blossoms, while the little white one creeps along by the roadside. Much prettier than either, is the now rather common alsike, with delicate pink heads. It is the *Trifolium hybridum* of science. Equally fine is the pompom-like crimson clover now and then grown in New England, *Trifolium incarnatum*.

Hidden away in the grass are the flowers of mouse-ear chickweed—a bad weed, as is also the very pretty little speedwell. Most of our weeds are foreigners from Old England. Perhaps they were passengers on the Mayflower and sprung up first upon the Plymouth coast. They own a pedigree that antedates Hastings and the Conqueror. King and president are all alike to them. Their office is to make the world more beautiful. It is a simple duty—but is faithfully performed. Who would wholly eradicate these humble servants that minister to our delight? Be sure, that as the children love them, they are good.

Brown University, Providence, R. I.

A NEW VERMONT BLACKBERRY.

BY W. H. BLANCHARD.

The species of blackberry here described and named belongs to the *Setosus* class, but it has little in common with the plants generally known as *Rubus setosus*, Bigelow, and to which Prof. C. H. Peck in 1891 gave the name of *R. hispidus* var. *suberecta*, and which Dr. P. A. Rydberg in 1901 named *R. nigricans*, these being generally soft-stemmed and beset with a multitude of soft bristles with as many glanded hairs interspersed.

RUBUS GROUTIANUS, n. sp. small, erect, five-foliate, glabrous plants with very numerous strong, bristle-tipped prickles and a short, bristly inflorescence.

New Canes.—Stems erect, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, reddish, glabrous and glandless, nearly terete with angled pith. Prickles numerous, 150 to the inch of stem, recurved, bristle-tipped. Leaves rather small, five foliate, yellow-green on the upper surface, lighter on the under surface, glabrous on both. Leaflets oval, long-pointed, outline entire, finely and

doubly serrate, the middle one widest, often somewhat rounded at the base, the others wedge-shaped. Petiole and petiolules grooved little or none, glabrous, prickles numerous, strong but slender, hooked; the petiole of the middle leaflet less than one-half inch long, the other leaflets sessile.

Old Canes.—Stems erect, prickles considerably impaired. Second year's growth consisting entirely of leafy branches tipped with inflorescence, one from the axil of each old leaf. Branch stems terete, zig-zag, six to nine inches long, prickles, glabrous, hooked. Leaves three-foliate, thin; leaflets short-pointed, broad-oval, rather coarsely serrate, glabrous; the petiolule of the middle leaflet short, the other leaflets sessile. Inflorescence a short raceme, one to one and one-half inches long, the axis and slender pedicels set at a great angle to it densely beset with slender prickle-bristles, straight and set at right angles to their axis with an occasional glandular hair on some plants and a faint pubescence. Flowers seven-eighth inch broad, petals slender, less than one-half as wide as long, appearing the last of June. Fruit globose, one-fourth inch or more in diameter, drupelets rather large, black, not productive; ripe the middle of August.

Type Stations: In Wait's pasture, West Wardsboro, Windham County, Vt., one mile east of the village, at an altitude of 1,700 feet, and in the road between the church and town house in Stratton, Vt., four and one-half miles west of the West Wardsboro station at a somewhat higher elevation. Open places, dry ground.

I found this species June 27, 1904. It is very abundant at the first named station, scattered over a large pasture. The stations in Stratton show that it is not a local plant. The name I propose is to commemorate that of people who were once numerous and prominent in Stratton, and for whom Grout Pond is named, and whose descendants are

scattered widely, including Dr. A. J. Grout, well known to moss students; but more especially to commemorate the hero of a famous anecdote. He was a precocious boy but five years old, who wandered away a few miles on the crust in the sugaring season and came into a little sawmill village called Ireland. Being told that he was in Ireland he asked them to help him find his way to "Stratton, North America."

Westminster, Vt.

MANNA.

MANNA is collected from the "*Tarfa*," or tamarisk, the manna ash, the camel thorn, the larch, the cedar, the Australian *Eucalyptus vimenalis* and even some edible lichens, such as *Lecanora esculenta*, and its allied species are known by this name. According to Burckhardt the manna from the tamarisk (*Tamarix gallica*) drops from the thorns, on the sticks and leaves with which the ground around these trees is usually covered, and must be gathered early in the day or it will be melted by the sun. "The Arabs cleanse and boil it, strain it through a cloth, and put it into leathern bottles, and in this way keep it uninjured for several years. The manna ashes (*Fraxinus ornus*, *F. Europaea* and *F. rotundifolia*), yield manna in consequence of a puncture made by an insect resembling the locust, known as *Coccus manniarius*. The substance is fluid at night and resembles dew, but begins to harden in the morning. *Fraxinus ornus* was introduced into England in 1730 by Dr. Uvedale.

The camel thorn, which grows in Northern India and Syria, produces the description known as *Al baj*, or Persian manna. The larch and the famous cedars of Lebanon also furnish a manna of their own, but although prized and eaten by the natives of the countries where they are found, these

kinds of manna do not seem to possess the useful properties of the manna ash, which is the manna of European commerce. The Australian *Eucalyptus criminalis* exudes crumbs of an edible manna, which is very sweet, and is used to produce the opaque drops called honey-manna, or melitose.

Of the edible manna lichens, *Lecanora esculanta*, and *Lecanora tartarea*, the coloring matter known as litmus is made. This kind of lichen is sometimes torn up and transported by violent gusts of wind and falls in showers several inches thick. In 1829, during the war between Persia and Russia, there was a great famine in Oroomiah, southwest of the Caspian Sea. "One day during a violent storm the surface of the country was covered with lichens, which fell from the sky in showers. The sheep immediately attacked and devoured it eagerly, which suggested to the inhabitants the idea of reducing it into flour and making bread of it, which was found to be palatable and nourishing."

During the siege of Herat, there is mention made of a hail of manna which fell upon the city and provided the inhabitants with food. In April, 1846, in the government of Wilna, a rain of manna occurred, forming a layer upon the ground three or four inches thick. It was of grayish-white color, rather hard, irregular in form, inodorous and insipid. It is to be found in the Great Desert of Tartary, on the steppes to the north of the Caspian Sea, in the Altai Range, in South America and in Algeria.—*Indian Planting and Gardening.*

A SALAD FRUIT FROM THE TROPICS.

AS our contact with the tropics becomes more and more intimate, and transportation facilities are improved, the number of fresh food products received from tropical

countries is rapidly increasing. Among the most promising of such articles is the avocado, (*Persea gratissima*) still little known, but rapidly increasing in favor. The avocado, though technically a fruit and usually referred to as such, is from the culinary standpoint no more a fruit than the cucumber. It is more accurately described by the term "salad fruit," and may be said to stand alone as the only fruit that when ripe is eaten almost exclusively as a salad. The nearest approach to this is perhaps the olive, which is eaten more as a relish. This unexpected role no doubt accounts to a large extent for the dislike or indifference often professed by persons tasting the avocado for the first time. As in the case of the olive, where the novice usually describes the fruit as an insipid pickle, the appearance of the avocado leads one to expect a sweet or acid fruit, and the more or less unconscious disappointment usually leads the experimenter to pronounce the avocado tasteless and oily. One writer describes it as having a "taste not much like that of our pears (the avocado is often called 'alligator pear'), and in first trying to eat the fruit one may pronounce it a poor pear, but a good kind of pumpkin," and adds the charitable suggestion that "cooking or preserving may bring out the hidden virtues."

Few persons who live for any length of time in countries where avocados are to be had fail to acquire a taste for this delicious salad fruit. It is the rule, however, that the taste for an entirely new article of diet has to be cultivated, and a food which was unknown to our fathers and which we meet for the first time after our tastes have been formed is seldom accepted at the first trial. In most cases it is only after repeated attempts, prompted usually by the assurances of the initiated, that a fondness for the strange article begins to grow. The human taste is, however, fairly uniform, and a liking for any food that is popular in its native coun-

try is usually acquired by the stranger if his first attempts do not create a prejudice so strong as to prevent further experiments. As examples of foods that when first tried outside of their native country were by most people either disliked or considered insipid, but which have since become firmly established may be mentioned olives, bananas, artichokes, chocolate, tomatoes, curries and peppers. With avocados the taste is usually acquired after two or three attempts, and many profess a fondness for the fruit at the first trial. That the taste when once acquired amounts to almost to a craving is attested by prices paid for the fruit in the northern markets, where 15 cents each is about the lowest figure at which they can be bought, and good fruit usually sells as high as 30 cents, though 50 or 60 cents is not an uncommon price. The avocado may thus be said to have taken the first steps along the lines by which most foreign fruits have been successfully introduced. An early impetus was received when the fruit was served on the tables of the rich and fashionable, its intrinsic merit being aided, without doubt, by the desire to inaugurate a novelty at once rare and expensive. The tendency to imitate this use assisted in increasing the demand until the fashionable hotels were able to score a point by adding the fruit to their menus. From this stage to that of introduction into the markets and fruit stores, where the general public will make its acquaintance, is, perhaps, the slowest and most crucial step in the history of a successful new product, and one that the avocado is at present undergoing.—*From Indian Planting and Gardening.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

INSECTS AS AIDS TO FUNGI.—The plant world is often divided by botanists into the two groups of seed-plants and spore-plants, or, as we commonly call them, Phanerogams and Cryptogams. The distinction is based upon the fact that one division is reproduced by seeds, while the other effects the same end by spores. The seed is a familiar object; as an example of spores, the dust-like particles composing the "smoke" of puffballs may be mentioned. The seeds are rarely distributed by insects—flowering plants find the wind, water, birds and mammals more useful—but the spore-plants, which may also make use of the wind and water, often seem to specially invite the insects. The ergot fungus of rye provides a sugary solution with its summer spores, to induce insects to carry them about, and some of the spores of rusts are similarly equipped. In the carrion fungi the offensive odor of the spore-mass attracts flies, which, alighting upon the sticky spores, carry many away attached to their legs and bodies. Although we make a distinction between seed-plants and spore-plants, there are really no seed-plants that are not spore-plants also, for the pollen grains are spores. Reflecting upon this we see that even the highest seed-plants, though they may adopt other agencies for their seeds, have found it convenient to call the insects to their aid in transporting the spores.

EDIBLE FOLIAGE PLANTS.—Certain species of *Coleus* are so extensively used in this country for the decorative effects of their variegated leaves that they are generally known as foliage plants. It may be news to some that in other parts of the world the species of *Coleus* have other uses. In India *Coleus barbatus* is cultivated for its tuberous roots, which are eaten as pickles. The plant is said to be ornamental enough to be planted among other flowers. The bread-and-butter plant (*Coleus aromaticus*) is another member of this genus cultivated in India. It has fragrant, fleshy leaves and is often eaten as a salad with bread, whence the common name.

INSPIRATIONS TO BOTANISTS.—There was a time, of course, in the lives of all great botanists when they knew absolutely nothing about botany. Some few came from botanical families, and so almost unconsciously acquired the rudiments of the science, but it is interesting to note what trivial things turned the attention of others toward plants. Thomas Nuttall was a printer, and came to America to follow that trade. Happening to become curious about the Virginia creeper, he grew interested in botany and soon became famous in the study. Asa Gray had his attention first turned to botany by the little spring beauty (*Claytonia Virginica*). Gray's early botanical studies were greatly advanced by his association with Dr. John Torrey, who, according to report, obtained his early botanical knowledge in a peculiar way. Torrey's father was sheriff in New York City, and during his term of office a certain early botanist was imprisoned for some small offense. From this botanist young Torrey obtained his first start in botany. Without doubt many of the readers of this paragraph can distinctly recall the circumstances that inclined them to the serious study of plant-life.

DEFINITION OF A FLOWER.—Even the botanist finds it hard to say exactly what a flower is. An essential part of every flower is either pistils or stamens, and usually both are contained in the same flower. These organs, however, are morphologically transformed leaves bearing spores of two kinds, the small spores being known commonly as pollen and the large ones as ovules. But even among the fern allies, such as the selaginella, there are leaves of this kind, so that under this definition it would not be incorrect to claim that some fernworts have flowers. If, however, we define a flower as one or more sets of essential organs surrounded by floral leaves, we will have to exclude the conifers and many amentaceous plants from the lists of those that bear flowers.

THE STRIPED MAPLE.—One of the handsomest small trees in any locality is the striped maple (*Acer Pennsylvanicum*). The deep green bark striped with pure white is most noticeable during the colder months of the year, but the drooping racemes of straw-colored flowers in early spring and the fresh dark green of the leaves in summer are equally attractive. With us the tree is seldom found in cultivation, but the British are more appreciative and often plant it. It is hoped that our own country will not have to be settled as long as those of the Old World have before we appreciate the beauty of a plant without regard to its place of origin. In England the tree is sometimes called snake's bark maple, though it may be questioned whether anyone ever saw a snake with bark on it! There seems to be no use for coining this absurd name when the plant already has several more expressive. In this country, in addition to the name at the beginning of the paragraph, it is called moose-wood, whistlewood and striped dogwood.

STYLE AND STIGMA IN POLLINATION.—There is probably no student of flowers that does not know, in a general way, what offices are performed by the style and stigma preliminary to fertilization, but many may not be aware of the exact nature of these offices. When the pollen falls upon the stigma it begins to germinate and gives rise to a structure called the pollen tube that pushes down through the style to the ovules. But pollen tubes cannot be built without nourishment and therefore the interior of the style consists of a nutritive tissue upon which the pollen tube can draw. The stigma is really the point at which this nutritive tissue comes to the surface and this accounts for the fact that the stigmatic surface is not always at the apex of the style. In some long styles the interior is hollow but lined with nutritive tissue. In cases where a single style serves for a several celled ovary a branch of the nutritive tissue is given off to each compartment.

THE INTERPRETATION OF SPECIES.—At present there are no unvarying rules for distinguishing new species. Whenever a student discovers an unrecorded difference between two plants he is at liberty to consider the difference specific if it appears so to him. At the same time, we are all aware that what may appear specific differences to one may not to another. Real specific differences, however, are not matters of individual opinion or judgment, but are more fundamental. By the long and tedious investigation of embryonic structures we may at last find just how much of a plant's character is due to its environment and how much is due to something deeper. When specific lines are finally drawn in this manner the botanist who has based a lot of new species upon mere fuzziness of leaves, color of flowers or size of fruits will be a surprised and disappointed individual.

Editorial.

With the beginning number of the new volume of this magazine a change will be made in the number of issues. The summer lecture engagements of the editor now take so much of his time that during this season the magazine is unavoidably delayed to the great annoyance of readers and publishers alike. With a view to escaping this in future, we purpose issuing ten numbers a year, skipping the months of July and August. At the same time the magazine will be increased in size by the addition of four pages to each issue, so that readers will receive exactly as much each year as before. We do not intend to lessen the amount of matter published, but simply to put it in more convenient issues. The September number will therefore be the first of the new volume, and this will be issued in late August so that the period in which no number is issued will not be long. The new volume will be improved in various ways, but from the letters recently received we appear to be publishing about the kind of matter wanted and shall continue on the same general lines. With this issue, bills will be sent to all whose subscriptions have expired and we trust that the excellence of the numbers issued thus far this year will incline every reader to a prompt renewal.

* * *

This magazine desires illustrated articles for use as leaders in the numbers of the new volume and we hereby offer a year's subscription for each illustrated article. We are well aware that this is not a magnificent price to pay, but it is better than the other magazines pay and we hope is only preliminary to a better price. It depends largely upon how the public receives the project. The illustrations

may be either photographs or line drawings in India ink and must *illustrate*. We do not care especially for illustrations that cannot be explained as well by the text. Photographs of fine specimen plants or groups of plants are desirable and so are drawings of interesting flowers, fruits, etc. In making such illustrations due regard should be had for the size and shape of our frontispieces. The text accompanying the illustration should follow the same general treatment we have given in previous issues. Articles on how to distinguish the various species in groups of showy wildflowers, articles on single plants of interest and similar subjects will be welcome.

* * *

It seems curious that in regions where Nature is most lavish with her botanical treasures, students of the plants are most difficult to find. Evidently the people at large take very little interest in the subject, for it is noticed that books on the botany of the South, whether technical or of a more popular nature, find most of their purchasers in the Northern States. It would be interesting to know just why this section of our country is so lacking in an interest in the plants. Possibly it is because botany is not given much prominence in school and college work there. When one considers the abundance of available material ready to the hand of the botany teacher during the very season when school is in session, he wonders that every school has not an enthusiastic class in botany, and every town a botanical club.

BOOKS AND WRITERS.

A few years ago the study of botany was supposed to begin and end in pulling flowers to pieces and learning their names. Now-a-days all this is changed, and the well-regulated text-book for school use invariably begins with seeds and follows the development of the young plant through stems, roots and leaves to the flowers and fruits. Such

courses are intended to cover a half year of school work, but when it comes to the course in botany for a second half year, opinions begin to differ. The recently issued "Introduction to Botany," by W. C. Stevens, presents a somewhat composite course, which includes a brief survey of the flowerless plants, a study of typical seed-plants and ecological and geographic botany. In the first half of the book we note numerous new and excellent illustrations, which cannot fail to make the text clear to the average pupil. The second part is equally well illustrated, but in the opinion of the reviewer not enough attention is given to the lower orders of plant life. The selection of typical seed plants to take the place of the dreary dissertations on plant relationships common to most books is a commendable feature, and the chapters on the adaptations and distribution of plants are equally good. There is an unusually good glossary. The inclusion in such books of a manualette of a few spring flowers cannot be commended. If systematic botany is to be taught at all, a real and comprehensive manual should be selected. The text of the present volume is excellent, and will no doubt add to the interest as well as to the knowledge of the pupils using it. (Boston: D. C. Heath & Co., 1905; \$1.50.)

The third annual meeting of the Botanical Symposium will be held from July 2d to 9th, 1906, at Mountain Lodge, Little Moose Lake, Old Forge, New York. Through the courtesy of the members of the Adirondack League Club the privilege of occupying the club house for one week is extended to the members of the conference. Tickets should be bought to Fulton Chain Station on the Adirondack Division of the N. Y. C. & H. R. R. Single fare from New York City, \$6.46. Board \$2.00 to \$3.00 a day. Stages will meet the party at Fulton Chain Station. Botanists are requested to notify Mr. Joseph Crawford, secretary, 2824 Frankford avenue, Philadelphia, Pa., if they intend to attend the Symposium.

THE AMERICAN BOTANIST

DEVOTED TO ECONOMIC
AND ECOLOGICAL BOTANY

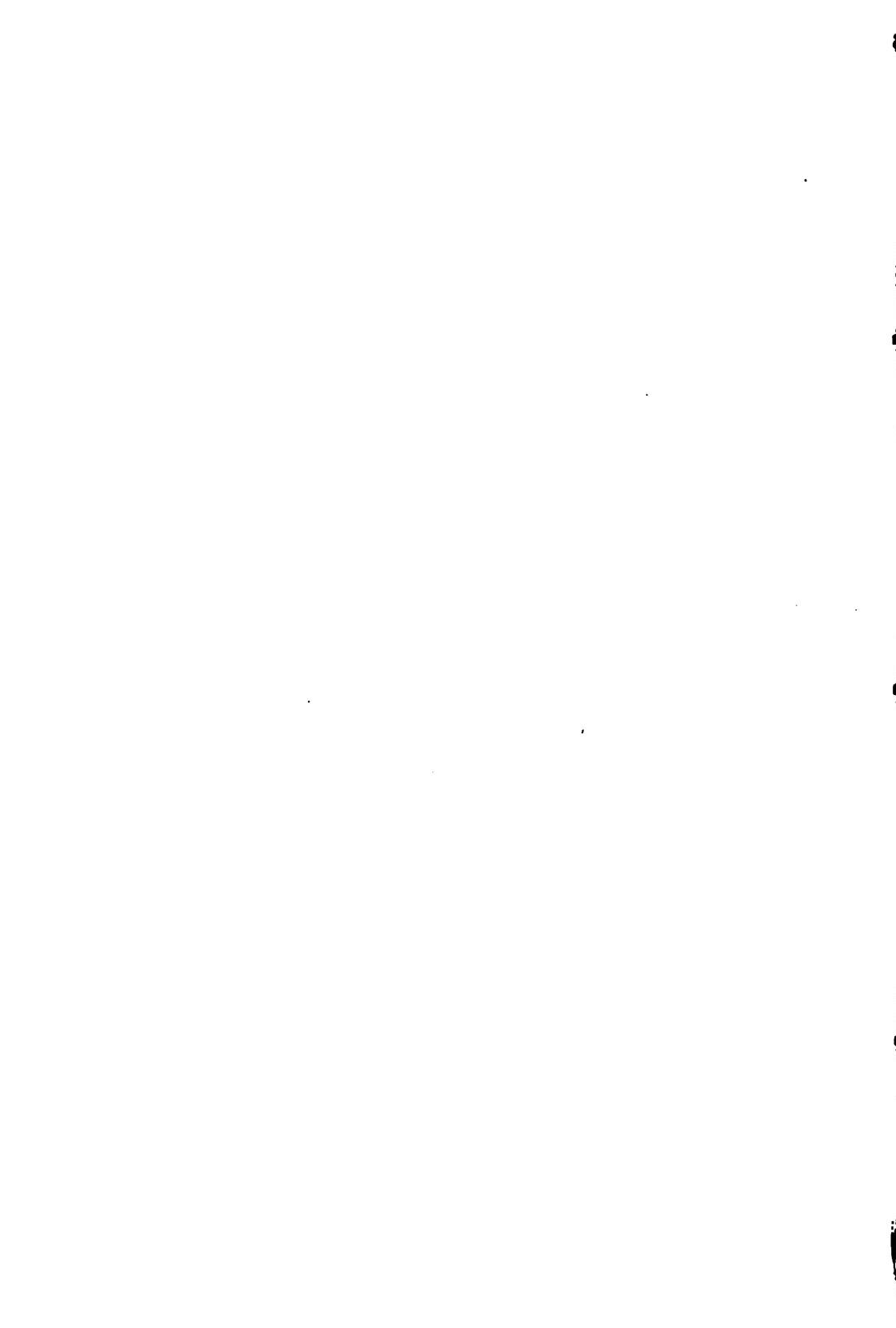
3-

EDITED BY WILLARD N. CLUTE



Volume XI

JOLIET, ILLINOIS
WILLARD N. CLUTE & COMPANY
1907



CONTENTS

CONTRIBUTED ARTICLES.

About Collecting.....	<i>M. F. Bradshaw</i> ,	36
An August Outing.....	<i>Frank Dobbin</i> ,	112
A New Dewberry.....	<i>W. H. Blanchard</i> ,	11
A Word Concerning Trees.....	<i>Frank Dobbin</i> ,	9
Botany for Beginners.—XXVI. Orchidales.....		83
Carnivorous Plants.....	<i>Grace Greylock Niles</i> ,	25
Common Things.....	<i>M. F. Bradshaw</i> ,	55
Edible Pine Seeds.....	<i>C. F. Saunders</i> ,	87
Flowers of Late Autumn.....	<i>Walter Albion Squires</i> ,	30
Mountain Misery.....	<i>C. F. Saunders</i> ,	53
Objects Embedded in Trees.....	<i>Prof. C. E. Bessey</i> ,	54
Other Scotch Immigrants.....	<i>A. S. Foster</i> ,	38
Our Poisonous Plants.....	<i>Dr. W. W. Bailey</i> ,	57
Perusin' the Pennyrite Country.....	<i>Sadie F. Price</i> , 76,	105
Some Fruits from a Tropical Garden..	<i>Willard N. Clute</i> ,	97
Something About Names.....	<i>Dr. W. W. Bailey</i> ,	4
The Baobab.....	<i>Dr. W. W. Bailey</i> ,	115
The Leaf Alert or Drowsy.....	<i>Dr. W. W. Bailey</i> ,	4
The Umbellifers.....	<i>Dr. W. W. Bailey</i> ,	32
Under Sierra Pines.....	<i>C. F. Saunders</i> ,	1
Wind Distributed Seeds.....	<i>Willard N. Clute</i> ,	73
Winged Seeds.....	<i>Willard N. Clute</i> ,	49
Editorial.....	22, 46, 70, 94, 118	
Books and Writers.....	24, 48, 72	

REPRINTED ARTICLES.

Cycad Sago	13
Natural History or Life History.....	115
Sugar	63

NOTE AND COMMENT.

Alaska, Vegetables in.....	20	Odor of the Fir.....	90
American Lotus Seeds.....	17	Odor of the Fir, Varying.....	67
Annuals, The Cause of.....	121	Orchis, Yellor Fringed.....	45
Arisaema, A Large.....	40	Osage Orange, Dissemination of	67
Azalea Occidentalis	19	Osier or Basket Willow, The.....	68
Bast, Commercial	119	Peanut, The, as Food.....	44
Bees	20	Pig Lily, The.....	65
Botany and Meterology.....	92	Plant Distribution	121
Botany, New Books on....	43	Plants with Peculiar Names.....	120
Buds, Color of and Growth..	41	Pollen, Toxic	65
Cocoa, Production of.....	66	Rudbeckia, Variation in.....	89
Color of Buds and Growth..	41	Seed Dispersal of Water	
Color Variations in a Common Trillium	16	Plants	90
Commercial Bast	119	Seeds, Winged	89
Datura, A Freakish.....	42	Shelf Fungus on a Leaf.....	21
Diana's Paint-Brush.....	120	Soapwort, Another.....	45
Douglas Spruce Tea.....	19	Solomon's Seal, Orientation of	66
Elaborate Terminology.....	19	Species-Making, Possibilities of	21
Elder, The, in Florida.....	19	Sunflower, A Large Head of.....	88
Fir, Odor of the.....	90	Sunflower, An Unfortunate..	66
Fir, Varying Odor of the...	67	Sunflower, The, And the Sun	66
Flowers, Undiscovered Attractions of	91	Swamp Mallow, Crimson-eyed	90
Flowers, Warning Colors of.	118	Tea, Douglas Spruce.....	19
Folk-Lore of Plants.....	118	Cause of Annuals, The.....	121
Gaulum Leaves that are not Leaves	88	Trees, Objects Embedded in.	41
Germination, Delayed.....	68	Trillium, Color Variation in.	16
Golden Currant in Oregon..	40	Vanilla, Production of.....	44
Higher Fungi and Mycorhiza	91	Vegetables in Alaska.....	20
Hop-Trees, The American..	43	Viola Selkirkii	17
Ibidium Beckii	18	Virginia Creeper, An Epiphytic	44
Lotus, American, Germination in	40	Warning Colors of Flowers.....	118
Lotus Seeds, American.....	17	Water Plants, Seed Dispersal in	90
Milkweed Seed-Pods, Novel use for	89	Wildflowers, Persistance of Certain	18
Monarch Butterfly, Range of	93	Winged Seeds	89
Mullein, The, In Oregon....	43		
Mycorrhiza and the Higher Fungi	91		

VOL. II SEPTEMBER, 1906 NO. 1

THE AMERICAN BOTANIST

—
10
CENTS
A
COPY
\$1.00
A
YEAR
—

CONTENTS

UNDER SIERRA PINES	- - - - -	1
Charles Francis Saunders.		
THE LEAF ALERT OR DROWSY	- - - -	4
Dr. Wm. W. Bailey.		
A WORD CONCERNING TREES	- - - -	9
Frank Dobbin.		
A NEW DEWBERRY	- - - - -	11
W. H. Blanchard.		
CYCAD SAGO	- - - - -	13
NOTE AND COMMENT	- - - - -	18
EDITORIAL	- - - - -	22
BOOKS AND WRITERS	- - - - -	24

WILLARD N. CLUTE & CO.
JOLIET, ILLINOIS

The American Botanist

A MONTHLY JOURNAL FOR THE PLANT LOVER

Issued on the 15th of each month except July and August

WILLARD N. CLUTE 333 EDITOR

SPECIAL NOTICE.—This magazine is issued in two half-yearly volumes of five numbers each. Subscriptions \$1.00 a year. All subscriptions must begin with a volume. To avoid the loss of numbers to regular subscribers, the magazine is sent until we are notified to discontinue and all arrearage paid. No one receives the magazine free except by special arrangement.

SAMPLE COPIES.—One cannot always judge of a magazine by a single number. Those who receive extra copies are asked to give them a careful examination. We know when a plant lover becomes familiar with the contents of this magazine he invariably becomes a subscriber. A single number may often be worth more than is charged for a year's subscription. The full set is almost a necessity to the plant student.

WILLARD N. CLUTE & CO., Publishers, 309 Whitley Ave., Joliet, Ill.

Entered as mail matter of the second class at the post office, Joliet, Ill.

THE AMATEUR NATURALIST

SAMPLE COPIES FOR
THE ASKING

The only Popular Magazine devoted exclusively to general Nature Study that is untechnical, yet scientifically accurate. It publishes the things you want to know about plant life, birds, animals, insects, minerals, etc., and interesting discoveries in astronomy, chemistry, geology, physics, and other natural sciences... Subscription, 50 cents a year.

CHAS. D. PENDELL, PUBLISHER, ASHLAND, ME.

THE CONDOR

A Bi-Monthly Magazine of Western Ornithology

Published by the
Cooper Ornithological Club

begins with 1906, its EIGHTH volume, and announces a continuation of the series of articles, ILLUSTRATED BY PHOTOGRAPHS FROM LIFE OF WILD BIRDS, by MESSERS FINLEY AND BOHLMAN, whose work has attracted favorable attention through out the country.

Other features of Special interest

Special Offer to New Subscribers

To anyone sending \$1.00, and mentioning this offer, we will send The Condor for 1906, and a 5x7 copyrighted PHOTOGRAPH OF WILD BIRD LIFE, taken by Messers Finley and Bohlman.

Subscription \$1.00 per year ... Sample Copy 10c

'gr. P. O. Box 404, Pasadena, Cal.

Mycological Bulletin

Natural Size Illustrations
of
MUSHROOMS

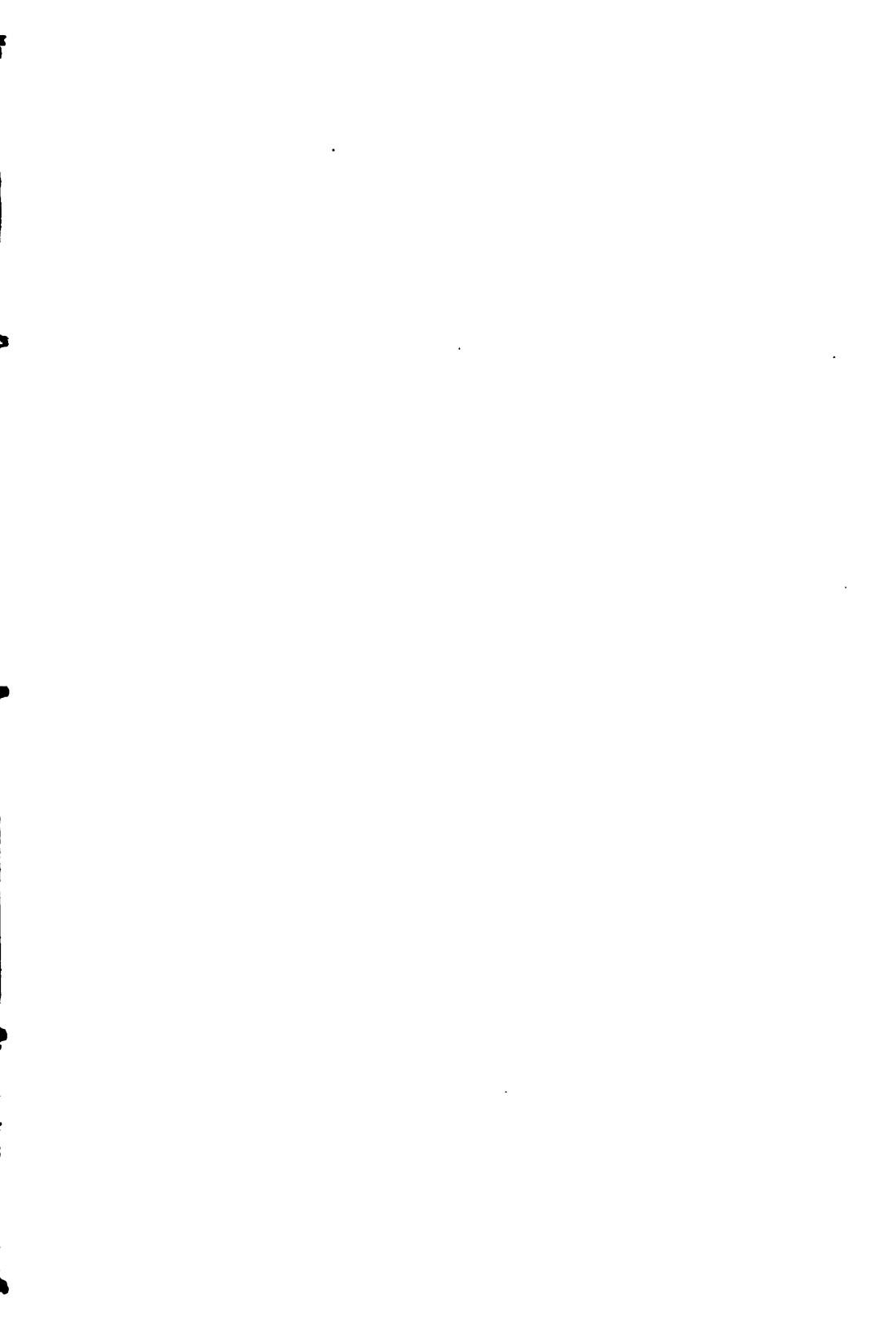
A little magazine for beginners
and amateurs, telling
something
about

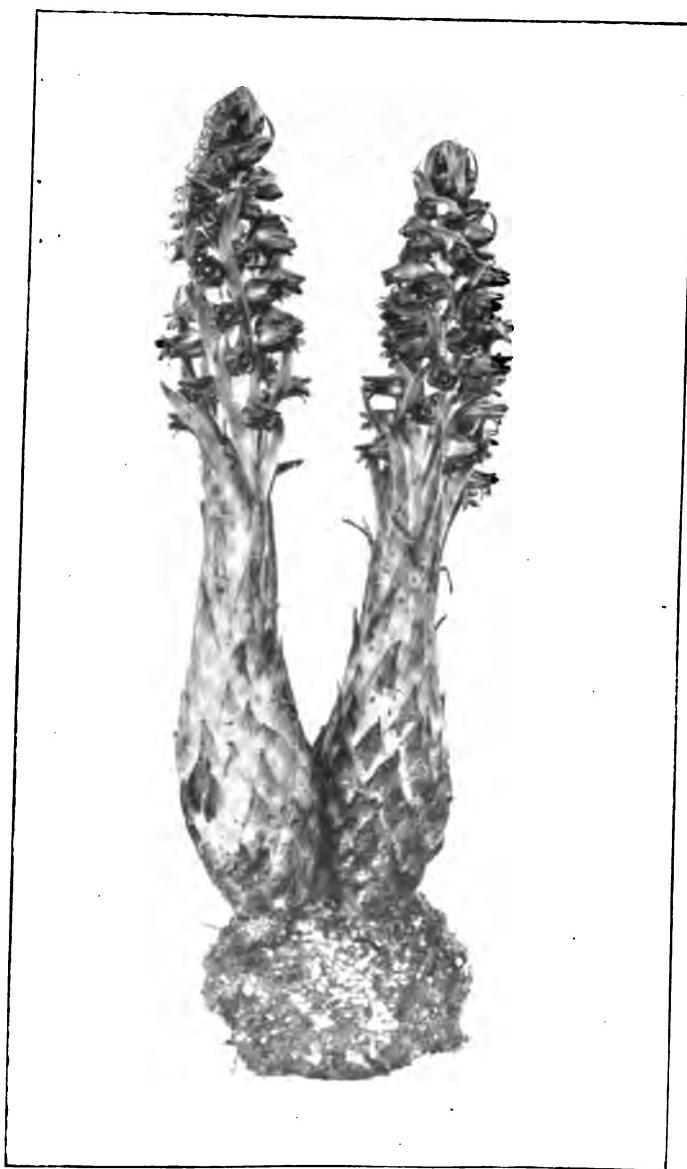
Poisonous and Edible
Toadstools and Mushrooms

All in Plain Language

Published Monthly Price 25c a Year

Address W. A. Kellerman, Columbus, Ohio





SNOW PLANT.—*Sarcodes sanguinea*.

THE AMERICAN BOTANIST

VOL. XI.

JOLIET, ILL., SEPTEMBER, 1906.

No. 1

UNDER SIERRA PINES.

BY CHARLES FRANCIS SAUNDERS.

TO one accustomed to the dense woodland growth of the Eastern States, the forests of the Sierra Nevada are a great surprise in their openness to the sun. These lines are written in the midst of a Sierra forest, the individual trees of which, in many cases 200 feet or more in height—often rise 75 or 100 feet before the leaf bearing limbs put forth. This fact, combined with the generous spacing between the trees themselves, gives to these primeval woods a sunny cheerfulness quite in contrast with the grave twilight which we naturally associate with coniferous forests.

This cheerful openness, largely free from undergrowth and flooded with sunlight day after day, through the entire summer, ensures an abundant crop of wild bloom, which is the joy of all flower lovers who pass through these mountains. Mariposa tulips, exquisitely marked like butterflies' wings; fritillary with greenish flower bells mottled with chocolate; brodiaeas in lavender, yellow, purple and gentian blue; chamaebatia with solitary strawberry-like blossoms amid fragrant exquisitely dissected foliage spread close as a rug beneath the giant pines; brilliant madias and golden eriophyllums, pansy-faced monkey flowers and gilias in as many hues as Harlequin—all these and many other are new to our Eastern eyes.

But many others are here, too, which a knowledge of the Eastern flora enables us to recognize at sight, though usually of different species from the familiar faces of home. Lupines of various colors, some as fragrant as the wistaria

that clammers about the porches "back East", close set over acres like a carpet and delighting the eye like some far flung fabric of fairyland. Irises, yellow violets (blue ones are *rarae aves* in California), phloxes and fire pinks, lilies and one-flowered clintonias, and tiny wild roses that bloom on lilliputian bushes that may be tucked in one's waistcoat pocket, greet us on every hand. By noisy mountain brooks we find Syringa bushes covered in July with masses of golden centered white blossoms; while hard by is calycanthus in lurid bloom—Western cousin of the beloved "sweet shrub" of old-fashioned gardens. Here, too, are great glorified azaleas, pure white save for a touch or two of yellow, and mats of a creeping, purple flowered ceanothus, easily recognized as cousin to the New Jersey tea of Revolutionary fame. The Klamath Indians call it by a name which means "arrowhead plant", because its small, tough leaves are shaped like inverted arrowheads. There is a quaint Klamath legend to the effect that in the ancient days when birds and animals lived as men, the hawks tipped their arrows with the leaves of this little plant. (See Coville's interesting and valuable "Notes on the Plants used by the Klamath Indians of Oregon.")

A search in the shadier parts of the woods, particularly near streams, will be rewarded by the discovery of several interesting orchids, among them a lovely and fragrant lady slipper (*Cypripedium montanum*). It is a treacherous beauty, however, for it is known to cause a troublesome eruption to some sensitive skins that have touched it. Menzies' rattlesnake plantain is a frequent orchid here, its leathery, white veined leaves spreading in cool undulations upon the dry ground. For elfin siestas on hot mid-summer noons, I know of no more alluring couches. Another orchid found in some abundance is the parasitic *Cephalanthera Oregana*, locally known as "ghost flower", because of its

entire lack of color. A delicate slender plant, draped all in white, it looks in the darkling dells, which it loves to dwell in, the very ghost of a flower indeed. The blossoms exhale the delicious aroma of vanilla, an orchid product, and one wonders if there can be some subtle connection between this child of the north and the tropical bean whose extract flavors so many household "goodies".

The plant student in the Sierra woods is struck with the abundance of plants of the heath order, which are parasitic upon the roots of coniferous trees or amid the decaying vegetable mould. Easily prince of these is the flaming Snow-plant (*Sarcodes sanguinea*), which arrests the attention even of the roughest mountaineers, and the traveler now and then sees specimens set in a lard kettle decorating the porches of mountain cabins. The plant has small claim to beauty of form, being indeed clublike and stocky; its great charm is its color—a rich, glowing crimson, which seen in the sunshine forces an exclamation of pleasure from the most stolid. Contrary to the implication of its name, it does not grow in the snow, but first pushes up to the light after the winter snows have melted. In these high altitudes, however, where the open season is comparatively short, many flowers bloom on the edge of retreating snow banks; and again, a belated snow fall is not unlikely to come after the advent of summer, and blanket the plants about. Under some such circumstances, the snow-plant may first have been seen and named.

Pine-drops (*Pterospora andromedea*) is another heath saprophyte that makes a striking show under the pines. Its wandlike, purplish stalks, leafless and exceedingly viscid, form clumps two feet high or more, strung near the summit with rows of whitish bells of bloom. This is one of the few Sierra plants found east of the Rockies, its range extending sparingly to Western New England, according to Gray.

Everywhere through the Sierra woods the common pteris or bracken fern is abundant, of which John Muir says: "Those who know it only in the Eastern States, can form no fair conception of its stately beauty in the sunshine of the Sierra. On the level, sandy floors of Yosemite valleys it often attains a height of six to eight feet in fields thirty or forty acres in extent, the magnificent fronds outspread in a nearly horizontal position, forming a ceiling beneath which one may walk erect in delightful, mellow shade." Some Indian tribes are said to have used the root as an article of food, though I have not learned how they prepared it. The roots are, however, split for use in basketry, and in order to give a black color to such strands, the squaws are said to chew them for some time, which removes the greenish fibre of the root. In the fall its warm brown fronds are a prominent feature in the autumnal coloring of the forest.

Pasadena, Calif.

THE LEAF ALERT OR DROWSY.

BY DR. WM. WHITMAN BAILEY.

THE murmurings or whisperings of leaves, so often referred to by writers, is not, of course, inherent to their structure. It is true that the ancient poets endowed certain plants with human attributes. Vergil, for instance, causes the root of mandrake to call aloud in the voice of Polydorus, buried beneath it. The vivid imagination of the Greeks created dryads and hamadryads, living and dying with special trees. Take such beautiful myths as the story of Rhoecus, which Lowell, Arnold, and others have rendered into English verse; or the flight of Daphne from impassioned Apollo, till, to escape him she assumes the form of a laurel tree. These are creations of an ardent and exquisite fancy.

Although leaves have not the power of self-utterance, yet are they played upon by the winds, so that, according to Nature's whim they give rise to softest whispers, soothing lullabies, sublime symphonies, or the harmonious crash of opera or oratorio. Most melodious of these aeolian harps are the needles of the pine, singing ever "in accents disconsolate", and simulating the ocean's surge.

"As sings the pine tree in the wind,
So sings in the wind, a sprig of the pine",

How often we long to interpret this music!

Apart from these sounds, however, or the whistle of sedges along a marshy shore, or the dry rattle of oak leaves persisting throughout the bleak winter, we think of leaves as quiescent, or only moving through the impact of a breeze. Some, indeed, like those of aspen or birch, "palpitate forever", but the pulsing is due to external causes.

Much as one may love a tree, we cannot attribute consciousness to it, though some recent authors appear to think that way. The strange movements we may note, and of some of which we shall here speak, can be explained on purely mechanical principles—unequal tension of tissues, or fluids in unstable equilibrium. In aspens and poplars generally the leaf-stalk is flattened contrary to the plane of the blade, and therefore catches every passing breeze, transmitting the motion to the blade. Rarely do we observe such leaves at rest. They have become symbolic of fickleness.

"O woman, in our hours of ease,
Uncertain, coy, and hard to please,
And variable as the shade

By the light, quivering aspen made",

It has been suggested that the motion imparted to leaves by the wind aids them in their special functions as organs of evaporation and assimilation.

Few people ever imagine leaves as moving by their own volition. As a matter of fact, however, a vast number do daily move more or less in response to light or shade. Particularly is this true of compound leaves so called, where several or many leaflets are attached to a common stalk. Instances of such leaves are those of the rose, of clover, locust and horse-chestnut. Leaves of one blade are called simple.

In the Pulse Family, *Leguminosae*, where the phenomenon is widely prevalent, there are some leaves whose pinnae in closing, point forward and overlap each other; some where they are directed backward; some where they are erect and others that are pendulous. The special method is constant, as a rule, to the genus. It will be observed that in all these cases the closed condition reduces the leaf to the very lowest degree of expansion. This, at once suggests the probable cause of the phenomenon, namely to, as far as possible, lessen the degree of radiation—or as we loosely say, to keep the leaves warm.

Linnaeus ever full of fancy, called the phenomenon "the sleep of plants", and some of the relaxed positions certainly suggest slumber. It may be even, that such repose is recuperative to the plant. We do not know this, nor can we explain or even guess at such remarkable movements as those of the East Indian *Desmodium gyrans*. This plant, closely related to our own tick-trefoils whose jointed, hook-covered pods break up into lozenge-shaped parts and line one's clothes in autumn, as one penetrates a wild copse, appears to have a purposeless movement. But where we do not know, it is well to suspend judgment.

This plant has a pinnately tri-foliate leaf, in which the middle or terminal leaflet is much the largest. This itself evinces some movement, but the small lateral ones are extremely active, keeping up an oscillating movement—and

at the same time sweeping through an arc. To see this movement one must have the plant either in a hot, moist climate—or under similar artificial conditions in a hot-house. The writer has frequently observed them in the fine conservatories of the Harvard Botanic Garden. Gray compares the jerking movements to those of the second hand of a clock, but without the clock's regularity. He writes "Stopping for a time, they again move briskly, always resting for a while in some part of their course, commonly at the highest and lowest points, and starting again without apparent cause, seemingly of their own will. The movement is not simply up and down, but the end of the leaflet sweeps more or less of a circuit. It is not set in motion by a touch, but begins, goes on, and stops of itself."

One is completely lost—at least the writer is—in trying to solve the riddle of this movement. But let us revert to "the sleep of plants" in their more familiar aspects. If one seats himself on a summer afternoon about four o'clock, in a large garden, or perhaps even in the woods, and observes what happens as the afternoon wears on, will, to his surprise, find extraordinary changes taking place in the appearance of the surrounding vegetation. In a botanic garden these alterations are very striking. I have fancied that at times one can even hear a little "click" as the leaves meet in closing.

Early in this garden session, all the leaves will be level and expanded, except, of course, such as are naturally vertical, like the *Iris* and most grasses. The compound leaves, one and all, will be spread open. If it should happen that our observer should doze himself for an hour or so, and then suddenly awake, he will not fail to note that something has happened.

Indeed, a transformation scene is being enacted. A lot of the leaves have closed—others are closing—some even

with a degree of suddenness, and this lessening of exposed surfaces causes a manifest difference in the appearance of the whole landscape.

Among plants in which the phenomenon of "sleep" is very marked, I will mention the sorrels or oxalids, the clovers and their congeners, like melilot, lucerne, all the locusts, and many peas and beans. Then, too, we have the really very sensitive species of *Cassia*, the *nictitans* and *chamaecrista*, very pretty plants of the pea family with rather large, yellow, almost regular, handsome flowers. The mere plucking of these delicate plants is enough to induce almost immediate movement of the numerous pairs of leaflets, which close upon each other till the whole leaf droops like a ribbon. It has a very tired look, and the sleep continues for some time after the disturbing influence has been withdrawn. Very much more startling is the movement in the true sensitive plant of hot-houses, the *Mimosa pudica*. Listen to what Gray says of it:

"In the well-known sensitive plant (*Mimosa pudica*) the foliage quickly changes its position when touched, appearing to shrink away from the hand. It makes three movements. First the numerous leaflets close in pairs, bringing their upper faces together and also inclining forward; then the four branches of the leaf-stalk, which here outspread like the rays of a fan, approach each other; at the same time the main leaf-stalk turns downward, bending at its joint with the stem. So the leaf closes and seemingly collapses at the touch. In a short time, if left to itself, it slowly recovers the former outspreading position."

This plant responds quickly to the rays of a burning glass directed upon it, and can be put to sleep by ether or chloroform, awaking again, if the dose is not enough to kill. Of course it is manifest that in this shrinking, the plant ex-

poses much less surface, but why should it be necessary to so quickly pull in sail? Contrast the open and closed leaves and note how changed is the aspect of the plant!

Movement of leaves reaches its acme in that vegetable wonder—the Venus' Fly-trap, *Dionaea muscipula*—a plant nearly related to our familiar sun-dew, but confined to a restricted region about Wilmington, N. C. In this, the blade as it may be called for convenience, consists of two lobes, each cut into sharp teeth on the margin and having the teeth of one side interlocking with those of the opposite. Indeed, the whole contrivance looks like and acts as a trap. The opposed lobes each have on their inner face three sensitive hairs. When these are touched, as by a fly or ant, the trap at once closes, and the more the creature struggles, the more closely he is held. Then, finally he is digested. The kindred sundew, also a gay trap, shows movement only in the disk-crowned, sticky hairs, which clothe it. This plant, too, is insectivorous.

Other movements in leaves might be cited, but already I exceed my space. In closing, let me add that the final movement, "the fall of the leaf" is only so far inherent, that it is provided for early in the season by the "absciss layer", a depression or line of separation that deepens as the season advances. Finally gravity alone, or freezing of moisture in this layer is enough to cast off the leaf. Sometimes, as with horse-chesnut, where yesterday stood a tree still fully clothed, there is today merely the undraped body—the skeleton even of the tree.

Brown Univ., Providence, R. I.

A WORD CONCERNING TREES.

BY FRANK DOBBIN.

IT was Oliver Wendell Holmes who said that: "the elm came nearer having a soul than any other American tree." It is indeed one of the most stately and graceful of

our native trees. But to the lover of nature, every tree possesses a soul or individuality of its own. The "whispering pine"—how we should miss it were it absent from our woods! The eternal freshness of its green, its balmy odor, the crisp crunch of its dead needles under our feet, the solemn music of its threnody, as the breeze plays through its branches; all these were they gone from our forest rambles would leave a blank that no other tree could fill.

Then there are the oaks of which we possess such a variety. Lacking the grace of the elm and the symmetry of the pine, but having an indefinable something about them that one can only characterize by the word strength. What more fitting emblem of enduring power than one of our giant white oaks with its spread of mighty branches, some of them as large as an ordinary tree! When I read Mrs. Heman's lines:—

"The woods against a stormy sky,
Their giant branches tossed."

I can always see, against a background of lowering cloud, a forest of oaks and pines, their branches whipped by a wintry gale.

Then there are the common plebeian maples—so common that we almost forget their beauty. Usually six species can be found native with us and the streets of our cities and larger towns are adorned with two or three more—strangers from over the sea, seeking a permanent home in America. The first bright dash of color in the spring woods, particularly if it be a low, swampy wood, is made by the opening buds of the red or swamp maple, and again when the summer is over and a hint of frost is in the air, they are wrapped for a second time in a mantle of red. What painter can ever do justice to the glory of an American forest in autumn! Its fame is justly world-wide. And we must remember that the maple is largely responsible for

this display of brilliant color. The English maples too must have some of this wealth of autumnal coloring or Tennyson could never have written:—

“That beech will gather brown
This maple burn itself away.”

In a woodland tramp a botanist, even though he be an amateur, finds enjoyment in looking for rare and seldom noticed species. I mark that day with a white stone when I saw the first tulip tree in my locality—the northern outpost of the species in this region. This station, by the way is only a few miles north of where Michaux mentions having seen the *Liriodendron* in 1792. The sassafras is also a local rarity and it has never been my good fortune to see a large tree, only a few shrubs hiding in the depths of the woods. I am informed, however, that half a century or more ago, a sassafras tree was not an uncommon sight.

We might go on indefinitely, enumerating our native trees, but no pen can do justice to their beauty or their subtle charm. Only when we have lived among them and learned to know them, can we say:—

“Oh, sweet it was and fair it was
In the green woods today,
With only the tree-tops bending near
And all the world away.”

Shushan, N. Y.

A NEW DEWBERRY.

BY W. H. BLANCHARD.

THIS dewberry which approaches *R. hispidus*, L. in many respects I propose to name:

RUBUS TRIFRONS, N. SP. Plants nearly or quite prostrate, with three-foliate, glabrous leaves and hispid, glandular, slender canes frequently tipping.

New Canes.—Stems prostrate, starting very late, slender, two to five feet long, reddish, glabrous and terete, covered with a thick growth of bristles, 200 to the inch of stem, and an abundance of glanded hairs interspersed. Leaves thickish, three-foliate, dark green, glabrous and slightly shining on the upper surface; lighter green and glabrous on the lower surface. Leaflets sharply serrate and doubly serrate-dentate, the middle leaflet broadly obovate, the side ones broad-oval with a slight tendency to divide, all somewhat rounded at the base and very short-pointed. Petiole and petiolules slender, slightly grooved, glabrous, bristly and glandular; the petiolule of the middle leaflet less than one-half inch long, the others sessile.

Old canes.—Dark red, the clothing of the stem much impaired, old leaves not persisting. Second year's growth consisting of leafy branches or stemlets, six to 12 inches long, tipped with inflorescence. The axis somewhat angled zig-zag, glabrous with a few weak bristles and glanded hairs. Leaves not thick, three-foliate or a few unifoliate, sharply serrate and serrate-dentate, glabrous, yellow-green. Leaflets short-pointed, narrow oval, the middle one short-stalked, petiole slender, nearly naked. Inflorescence a short raceme, axis $1\frac{1}{2}$ inches long; pedicels about 12 subtended by narrow bracts, set at a moderate angle; peduncle and pedicels slender, hispid, pubescent with glanded hairs interspersed. Flowers one inch broad, petals slender, less than one-half as wide as long; appearing the last of June. Fruit small, maturing, but few drupelets, ripening the last of August.

Type station:—Wait's pasture, West Wardsboro, Windham County, Vt., one mile east of the village. Altitude 1,700 feet open land. Abundant in Stratton, West Jamaica and West Wardsboro.

This species was discovered by me, June 27, 1904. It is abundant in the section named and grows in thick beds

which in flowering time are a beautiful mass of white flowers. The new canes do not hug the ground, but are kept up by the great mass of old growth and tip rather sparingly. It is a coarser plant than *R. hispidus*, which grows close to the ground, branching and tipping readily with shining crenate-dentate, persistent leaves and small inflorescence with inconspicuous flowers.

Westminster, Vt.

CYCAD SAGO.

THE Sago of Commerce is the product of the *Metroxylon Sagu*, a species of palm which is indigenous to the forests of the marshes of Borneo and the neighbouring islands of the Eastern Archipelago. It is also yielded in considerable quantities by several other members of the great palm family as well as by a variety of herbaceous and other plants that luxuriate in the warmth and moisture of the evergreen forests of the tropical world. Of the last mentioned group few are more interesting than the beautiful feathery leaved cycads of India. These humble plants, whose graceful foliage resembles that of some of the indigenous tree ferns or of the delicate rattan palms, occur generally as sporadic under-shrubs in the forests of the plains at low elevations as well as in the secluded valleys of the hills. Their glistening green tiers of abruptly pinnate leaves that are borne in simple whorls at the tops of the stems lend softness and charm to the varied vegetation of the localities in which they install themselves, while their rugged dark brown cylindrical trunks, from the resemblance which they bear to the stems of the palms, have earned for the cycads the misleading epithet of the decorating palms of India and the East.

The tallstemmed, much branched *Cycas circinalis* of the evergreen forests of the Western Ghats and Ceylon and the branched or simple-stemmed *Cycas Rumphii* of the low-lying forests of the Malabar Coast, Tenasserim, the Mergui Archipelago and the Andaman Islands, together with the simple-stemmed *Cycas pectinata*, contain in the inner medulla of their trunks an abundance of edible and nutritive starch. The ovoid fruits of the species, too, that are borne in alternate rows or series upon the edges of the fleshy pedunculate bracts are turgescent with quantities of a mealy starch which is eagerly sought after and consumed by the hill tribes. The excessive periodic demands which fruit-bearing makes on the reserves of starch stored up in the stem result in the latter being left, after fruiting, in a condition of almost complete denudation of that substance. For purposes of exploitation of the cycads for sago they have, therefore to be handled before fruitescence. Moreover, the activity of the species is intermittent; it has a distinct period of growth followed by as distinct a period of recuperative rest. After the first showers of rain of the South-west monsoon, it enters upon its greatest vegetative activity. The sap then ascends rapidly up the stem and a cone of more or less circinate leaf-buds is given out at the top above the circle of insertion of the previous year's fronds; these elongate together and with the older fronds, form the foliage of the plant for the remaining months of the year. When the fronds are young, they assimilate vigorously and soon help to restore to the recesses of the plant the reserve material which had been previously requisitioned. As they grow older, their activity diminishes, until in the cold weather it altogether ceases.. In the hot weather supervening, the fronds turn yellow and, at its close they droop and wither.

The method of extraction of cycad sago may be briefly

described. On the discovery of a well-grown promising individual, it is felled flush with the ground and divested of its fronds as well as of the dry outer layers of its annularly furrowed stem. It is then carried to the home of the operator where he proceeds to cut away all the remaining part of the stem except the innermost cylindrical axis. This delicate core is now carefully sliced into thin oval or circular discs which are spread upon mats and dried in the sun. When quite crisp, they are pounded into flour which is thereafter sifted and mixed in water. The resultant mess is then poured into a pot and allowed to stand until the starchy substance is deposited at the bottom and sides of the vessel. The clear liquid above the deposit is now drained off and the precipitate itself, while yet fresh, rolled about between boards until it resolves itself in the spherical pellets that are known as sago. These pellets, on drying and partial steaming, are passed through sieves that are graduated variously for the several grades, such as bullet sago, pearl sago and the like. The majority of the Indian manufacturers, however, are content with the production of the amorphous meal which, after desiccation, is stored up for use. The elimination of the starchy farina from the seeds proceeds upon principles that are more or less identical with its extraction from the stem of the plant. In some localities, the fragrant ripe fruit is picked and dried until the yellow pericarp shrivels and cracks. The hard endocarp is then broken up and the kernel, while fresh, pounded and mixed with water. In other parts of the country the mature but unripe fruit is split into halves along the sutures of the endocarp and dried until the kernel shrinks and separates from it, after which it is treated in the usual manner.

The yield of dry sago from an average sized stem of about four feet in length and two in circumference amounts to about five pounds. The quantity of farinaceous material

obtainable from the seeds of a plant of the same dimensions averages annually to about that amount. When it is remembered that the sago obtainable from the seeds of the cycad is, for all practical purposes the same in quantity, too, as that from the stem of the plant, it will be admitted that there is no good reason beyond custom, perhaps, to support the practice of felling it for the elimination of the product. It is evidently a practice which the voracity of some barbarous tribe inaugurated ages ago and which their comparatively enlightened descendants on the hills and plains still keep up.—*From an article in Indian Gardening and Planting.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

COLOR VARIATIONS IN A COMMON TRILLIUM.—A short distance from my office there is, in a swampy piece of woodland, a patch, perhaps five feet square, of the common purple trillium in which hardly any two flowers are the same color. They run through all shades from the usual dark red to a light yellow and light green. Some are a pale dirty pink, some speckled and some striped. None are solid colors except the green and red ones. A few smaller clumps near these also show the same variations. Is this something unusual or do they often do it? Have found them in other places when they were a dirty yellow

(*T. Alba*) but never when they showed so many colors.—*J. H. Massey, Bolton, Conn.* (The red trillium is occasionally reported to sport in this way and the yellowish white form is usually called the variety *alba*. In the middle west this plant almost invariably has *pure white* flowers and it now becomes a question as to which plant is really entitled to a name meaning white. In regions where the red *Trillium sessile* and *T. recurvatum* grow, one may often find yellowish flowers, but never pure white ones. This seems to indicate that the pure white flowers mentioned above may belong to a different species.—Ed.)

VIOLA SELKIRKII.—A dark blue variation in the color of this species which I first observed last year has again appeared, evidently intending to be permanent. It is in all respects—large flowers, abundant bloom, beardless petals, season, station and everything—exactly like the type except the color which is much like that of the common blue violet (*V. palmata* var *cucullata*). It seems to be, this year, nearly as common with me as the species. I would like to know if any of your other readers who are interested in violets (and who is not) have observed any such variation in the color of this species.—*Leston A. Wheeler, Jamaica, Vermont.*

AMERICAN LOTUS SEEDS.—It is stated that the Indians cultivated the American lotus (*Nelumbium luteum*) for the sake of the seeds which they used as food. The seeds were sometimes called yonker-pins, a name derived, no doubt, from the same root as water-chinquapins, by which title they are more commonly known. Another name for the seeds is 70-year acorns, it being a common saying that the seeds take seventy years to germinate, owing to the hardness of the testa or seed coat. Thick seed coats are characteristic of the whole water-lily tribe, and growers of these plants usually file a hole through the seed-coat to allow water to enter when they wish to hasten germination.

PERSISTENCE OF CERTAIN WILD FLOWERS.—In many species, owing to the arrangement of flowers and leaves on a single short stem, as in trillium, picking the flowers usually results in great injury to, or complete destruction of, the plant. In others, such as the bloodroot, violet, Dutchman's breeches and hepatica, picking the flowers is of no especial injury to the plant, the only harmful consequences being the prevention of seed production. Plants that depend largely upon the production of seeds to keep up the race are the only ones that suffer much from flower gathering, unless as in the first case mentioned, all the leaves are taken with the flowers. The plants that persist longest in regions where flower gathering is common, are those that have developed two ways of reproduction. In such cases, seed production appears to be principally for the extension of the species into new regions, while runners and underground branches keep up the race at home. It would be exceedingly difficult to eradicate the adder's-tongue (*Erythronium Americanum*) from a locality without plowing up the soil, for each small bulb commonly sends out several runners each of which forms a new bulb. Since only a few bulbs flower annually the supply is kept up. The mandrake (*Podophyllum peltatum*) may be cited as a plant with branching rootstocks that is able to persist under difficulties.

IBIDIUM BECKII.—Who, except the name-tinkerer, would recognize our common and familiar ladies tresses (*Spiranthes simplex*) under the outlandish name at the beginning of this article? And yet, if we are to follow the leaders of this movement for overturning well established names, this is what we shall have to call the plant. A few years ago a botanist who is considered by his associates as above the average in acuteness, asked us to change the generic name to *Gyrostachys*. Many made the change, but already they find they have been following a false prophet.

Before we are willing to change from *Spiranthes* to either *Gyrostachys* or *Ibidium* we want to be assured that this change is to be the last. Thus far, the only effect the movement for a stable nomenclature has had upon scientific plant names is to make them so unstable that the common names are used by preference when one wishes to be exact. The whole family of orchids has fallen an easy prey to the changer of names. Nearly three-fourths of the names given to the orchids in Gray's Manual are no longer applied to the plants by the "advanced" botanists.

AZALEA OCCIDENTALIS.—This species of azalea is frequent among the California mountains, and among the sheep herders, goes by the name of sheep- or poison-laurel. It is quite poisonous to sheep, and the herders will often drive their flocks considerable detours in order to avoid localities where it is known to grow.—*C. F. Saunders, Pasadena, Calif.*

ELABORATE TERMINOLOGY.—New terms are not always produced by the systematist; his brother studying the physiology of plants occasionally does something noteworthy. One of his latest is the proposal of the word parallelheliotropocampylostrophic to indicate the bending and twisting of a plant toward the light.

DOUGLAS SPRUCE TEA.—The leaves of that noble Conifer of the Pacific Slope—the Douglas spruce (*Pseudotsuga Douglasii*)—when steeped, make a very palatable, refreshing substitute for Chinese tea, and old mountaineers, when their supplies run low, sometimes use them so; just as hemlock leaves used to be employed by lumbermen in Eastern woods—*C. F. Saunders, Pasadena, Calif.*

THE ELDER IN FLORIDA.—The editor of the *Florida Agriculturalist* has the following to say about one of our common plants. The common elder, (*Sambucus Canadensis*), is not usually considered an ornamental plant. Yet it

certainly is deserving of a place in the list. About two years ago, we mentioned the fact that it was an evergreen, and almost an everflowering shrub or small tree in this State. Our tree has been almost constantly in bloom since that time. We do not think that there has been a month at any time that there have not been flowers on it. Of course, it blooms more freely early in the spring, and is at this time covered with bloom. One tree is trained to a single trunk, which is 14 inches in circumference, three feet from the ground, and 15 to 18 feet high. It would often have ripe berries, green ones and flowers at the same time if there were no birds. But the latter pick the berries as fast as they color. Try an Elder, you will not regret it.

VEGETABLES IN ALASKA.—All plants have their limits as to temperature. There is a maximum and minimum for each species beyond which it cannot go. Some of our northern plants do not grow well in the tropics, because it is too warm; other plants will not grow in the north, because it is too cold. As far north as Alaska most of our common garden vegetables can be grown near the coast, but corn, melons, peppers, egg-plant, tomatoes and pumpkins show their tropical origin by declining to ripen in such a climate.

BEES.—Many a botanist, who knows that bees assist in pollinating the flowers has but a hazy idea of the number of kinds engaged in the work. The bumble-bee and the honey-bee are commonly supposed to be the only ones. The fact is, however that there are nearly five thousand kinds of wild bees, big and little, most of them living solitary lives instead of in colonies as our honey-bees do. A single days collection will bring a dozen or more kinds. These solitary species do not lay up a store of honey, but always leave enough food in the shape of pollen and nectar with the eggs to suffice until the young bee can forage for itself. According to a writer in *Harper's Magazine*, certain bees,

called cuckoo-bees, take advantage of this fact and lay their eggs beside the food stores of their more provident neighbors, in this way acting to all intents and purposes as the cuckoo does among birds.

SHELF FUNGUS ON A LEAF.—The shelf fungi growing on old logs and even on standing trees are familiar objects, but we scarcely look for such hard woody growths upon leaves. Thus far there has been but one species reported with this habit and this has recently been described as a new species. The plant has been known for some time, however. The editor of this journal saw specimens among a collection of South American plants half a dozen years ago.

POSSIBILITIES OF SPECIES-MAKING.—In Gray's Manual the section Biota of the genus *Aster* contains but two species which botanists have agreed to call *Aster corymbosus*, and *Aster Macrophyllus*. Both species are fairly common, widely distributed and can live in a variety of habitats. This diversity of habitat, of course, has produced a great number of forms differing in slight degree from the typical species and has long offered a tempting field for the work of the species-maker. It is no surprise, then, to hear that Dr. E. S. Burgess has written a book of more than four hundred octavo pages in which he separates our two well known, but unfortunate plants into no less than eighty-one new species. It is safe to say that none but the author could identify these eighty-one species if the labels should accidentally get mixed, but the author, undaunted by this array of species, has named ten more varieties and nearly two hundred and fifty lesser forms! Two species expanded into nearly three hundred and fifty forms. This ought to amuse even the hawthorn specialists. If anybody ever starts in on the human race with similar ideas of what species are, some families will doubtless be found to consist of at least half a dozen new species and possibly one or two new genera.

Editorial.

That the removal of a well-established magazine from one part of the country to another is a task of considerable magnitude we discovered this summer in preparing for the transfer of *The Fern Bulletin* from Binghamton, N. Y., to its new home in Joliet, Ill. It became necessary to close the office of the AMERICAN BOTANIST during the months of July and August and to give all our attention to the extra work in hand. Owing to this, we have been obliged to disappoint applicants for sample copies during the summer, but we are sending a copy of this issue to all who applied, and we trust that this explanation may make matters right. For the first time in five years, the editor and the two magazines are under one roof. A new building has been erected with an eye to their requirements and it is expected that business will now move along better than ever. We hope that we are not too late to secure the subscriptions of those who have asked for samples. At the present writing the back numbers of *The Fern Bulletin* are still to be unpacked, but full files of THE AMERICAN BOTANIST are again ready for mailing.

* * *

In order to start the new volume properly, we are sending with this number bills to all subscribers in arrears. Those who do not receive a bill will understand that their subscription is paid to the end of the year at least. Excepting sample copies, which are plainly marked, the magazine is not sent free to anyone. A large number have taken advantage of our offer to send the magazine for two years for \$1.60, if paid strictly in advance. Those whose subscriptions have just expired, may still take advantage of this

offer if their renewals are sent before the October number appears.

* * *

We again call attention to our offer of a year's subscription for each illustrated article that can be used as a leader. The illustrations may be line, wash or photographs, but should be made with reference to our requirements for frontispieces. No restrictions are placed upon the number of articles submitted by one person. Nor need the writers be subscribers to the magazine. A year's subscription goes with each article accepted.

* * *

This magazine is also looking about for an associate editor. Someone who can write acceptable paragraphs for the Note and Comment department is needed. One of the reasons why readers have expressed a preference for this department is doubtless the fact that every paragraph represents the material from which an article of several pages might be made; in fact many of the paragraphs are condensed from such articles. There is not, however, an inexhaustible supply of these articles, as any reader of botanical publications must have discovered. One who can constantly produce available paragraphs will be somewhat difficult to find, we fear. There is now no special reason why this magazine should not make another increase in the number of pages except that sufficient articles of the right kind are difficult to obtain. If we were willing to print anything about plants the task would be easy enough, but we want only the best.

* * *

Since the beginning of this magazine we have printed a goodly number of extra copies of each issue for the express purpose of completing the files of those who are now subscribing, and may desire full sets. Whether the back numbers of a magazine are valuable or not depends entirely

upon its subject matter. The back numbers of many magazines are as readable as the current issues. This we believe to be the case with THE AMERICAN BOTANIST. Every number of the ten volumes issued is different from the rest, and if you like the present one, you will find the others well worth purchasing. The stock of some volumes is becoming very small—there are less than two hundred sets of volume III remaining—and a full set is not likely to be available much longer. If you do not feel like ordering a full set, ask your nearest library to do so. In this way you can always have the magazine near for reference without expense to yourself.

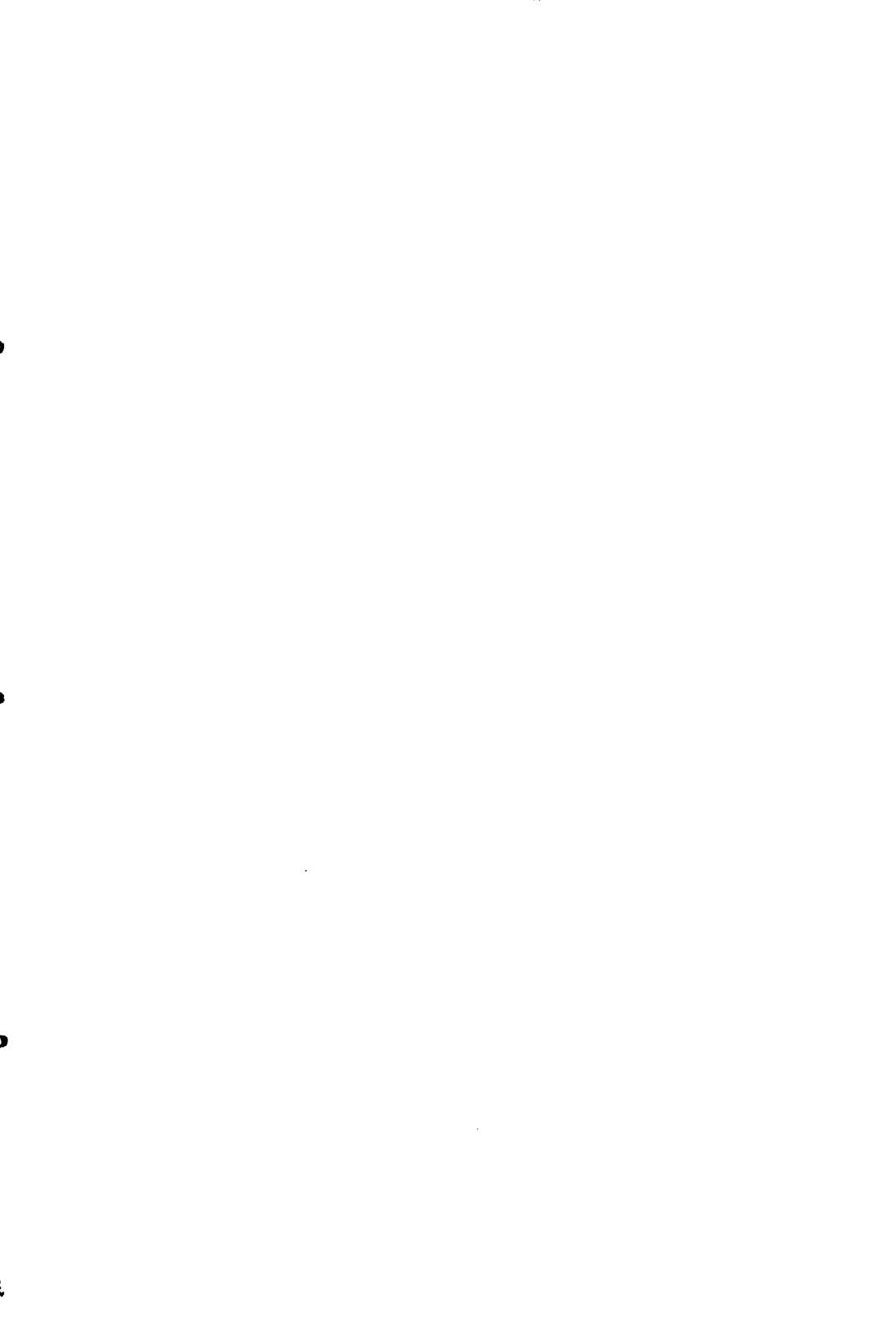
* * *

This winter we expect to dispose of all our odd back numbers as sample copies and for the last time we offer to send free any numbers that may be missing from the files of our subscribers. We are anxious that everyone should have complete volumes. Look up your missing numbers at once. Next month it will be too late.

BOOKS AND WRITERS.

The New York State Library has compiled a list of the best books issued in 1905 for the convenience of other libraries. In this list the editor's "Fern Allies of North America" has been given a place—one of the few scientific books so listed.

Among recently issued books of interest to botanists may be mentioned Wythes and Roberts' "Book of Rarer Vegetables", Slosson's "How Ferns Grow", Henshaw's "Mountain Wildflowers of America", Shelton's "The Seasons in a Flower Garden", and Knuth's "Handbook of Flower Pollination". Several of these will be reviewed in subsequent issues of this magazine.





"Dawn Walkers" or Picture Play.

THE AMERICAN BOTANIST

VOL. XI.

JOLIET, ILL., OCTOBER, 1906.

No. 2

CARNIVOROUS PLANTS.

BY GRACE GREYLOCK NILES.

TWO forms of our northern pitcher plants grow abundantly in vast areas of sphagnous boglands, producing odd crimson-purple blossoms in June. It is a rare vision to behold a wild meadow ablaze with these side-nodding blossoms. One variety of this species is distinguished by yellowish-green pitchers with a lighter veining; while the other form displays deep crimson pitchers, marked by deeper veinings. After the blushing petals of these side-saddle flowers fall, the sepals cling to the hard padded shell of the stigma, reminding one of weird goblin blossoms. These remain on the flower for months, until the numerous seeds are sown broadcast over the meadow. The surface of the stigma resembles a padded cushion. Early writers saw in it a resemblance to the pillion, or cushion of a ladies side-saddle, from whence the name side-saddle flower arose. The flowers have no especial fragrance, the attraction of the plant lies in the honey-sprinkled leaves. These consist of large hollow tubes, somewhat resembling pitchers. The rim is ornamented with a band of crimson, upon which is sometimes a secretion of honey. Similar crimson veins extend down the outside of the pitcher to the roots of the plant, and these honey-guides lead small ants and snails upward to the orifice of the pitcher. On the rim these little creatures, as well as the flies and mosquitoes which have been attracted, are allured beyond the line of safety, when they slip down the smooth inner surface to the depths of the watery fluid. All their attempts to escape are useless, once in contact with the contents of the pitchers. And even if the fly should not reach the juices of the tube, the deflexed, honey-tipped hairs

lining the lid would make it impossible for him to back out of the trap. Entrance is delightful; but once within, the sunshine is lost forever.

The leaves of the pitcher plant grow in a basal rosette. The outer and older row of tubes are often filled with their prey. They are the first to wither, turn brown, and in time decompose. With their freight of dead insects they materially enrich the soil which feeds the plant.

A southern species of this genus, *Sarracenia variolaris*, produces a hood which covers the orifice of the pitchers so closely as to exclude all rain; yet the tubes secrete a viscid liquid which causes the death of all insects prying beyond the cover. The western carnivorous plant, *Darlingtonia California*, grows in the vicinity of Mount Shasta, California, at an altitude of 1,000 to 6,000 feet above sea level. The pitchers are often two feet high, and an inch in diameter. The top is inflated, and the whole tubular leaf is spirally twisted about half a revolution to the left. The hood, or lid of the pitchers is different from those of the eastern pitcher plant. The top consists of an inflated sac, about four inches across, with transparent windows in its roof, and having underneath an opening, an inch or less in diameter. At the upper extremity of this opening hangs a two-lobed blade resembling a fish's tail, which is attractively colored, and twisted. The inside is covered with stiff, erect, dewy-tipped hairs. The honey-bait, as in the eastern pitcher plant, is situated about the rim of the pitcher, and along the crimson veining of the leaf. A viscid fluid also is secreted in the depths of the tubes, notwithstanding the fact that the dew and rains are absolutely shut out by the twisted, two-lobed blade of the hood. Yet the insects required for the nourishment of this plant are attracted, and must be small enough to pass up through the narrow door of the hood. Insects crawl up the crimson veining of the tubes from the roots, until they arrive at the honey-tipped rim. Others

are attracted by the gaudy bonnet strings of the lid, and alight upon its outer surface. These ribbons are twisted in such a manner that an insect upon the outside follows the honey trail along the spiral folds, and enters the interior before he is aware. The same deflection of bristling hairs occurs in this species, as is observed on the lids of our northern *Sarracenia*, so that when the insect decides to turn about, and make his exit, the bristling spines prevent progress. He now must re-enter the opening beyond, and looks for a place of egress. He discovers the pretty windows in the roof of the inflated tube, and every step over the deceptive hairs bring him nearer to his doom. Escape is impossible.

The Family *Sarraceniaceae* was named by the early botanist, Tournefort, of Europe, in honor of Dr. Sarrazin, of Quebec, who first sent specimens of our northern species, with a botanical account of its home life to Tournefort. It was first described and illustrated in color in Phillip Miller's "Figures of Plants" in 1760. The plate is an excellent one.

Pitcher plants may be easily cultivated, and attract much interest, and always give pleasure to those observing their strange habits. Of course in home or schoolroom culture it is necessary to occasionally fill the pitchers with rain water. The plants are known to country folk as Indian-dippers, or Saint Jacob's dippers. They are also known as huntsman's-cup, hunters and berry-pickers, it is said, using them as dippers or drinking cups. Yet knowing the habits of these pitchers, and their secretion of a poisonous fluid, they should not be put to such use. A cornucopia made of fragrant white birch bark, so plentiful about the forest areas of the north, is a much cleaner and safer goblet.

Many wild animals, it is reported, have learned the habits of the Pitcher plant, and avail themselves of stealing the food which the plant has ensnared in its tubular leaves. Two species of insects are associated with some of the southern

Sarracenia. They evade the seductive honey-trap, and in a peculiar manner store their eggs in the contents of the pitchers, where the larvae are nourished by the moisture and shelter afforded by the hooded leaves.

The Sundew Family (*Droseraceae*), is another familiar group of insectivorous plants, found in haunts similar to those of the pitcher plants. There are but two known genera, all species of which are flesh eating. The genus *Drosera* has seven species north of Mexico, while *Dionaea* has but a single species—*Dionaea muscipula*, which is native to North Carolina.

Our most common northern sundew is the round-leaved species—*Drosera rotundifolia*. It grows in Sphagnum along old wood roads, near brooksides, and in the deeper swamps, reminding one of a species of moss rather than of a wicked, blood-craving plant. The ladle-like leaves are ornamented with dewy-tipped hairs. These act as tentacles whenever an ant or fly alights upon the leaves to sip the dew, giving out an extra amount of viscid fluid. Like sly little fingers each hair begins slowly to close inwardly, until the prisoner is tightly held by the adhesive dewy hairs. The more he struggles to free himself, the more fluids the plant pours out, and the faster the little hairy fingers close about him. Once the insect alights upon these innocent looking leaves he is doomed.

The leaves lie in a rosette flat upon the sphagnum, and thus attract such crawling insects as ants, and small flies. When an insect is entrapped the leaves throw out an acid, digestive secretion, and after the plant has absorbed the juices of the insect, the dewy hairs, or tentacles, return to their normal position, lying in wait for another victim. A leaf or stone dropped on these bristling leaves will bring about the closing in of the tentacles; but when the plant instinctively discovers the mistake, these tentacles return quickly to their natural

position. Often a tentacle will not begin to move until ten seconds after it is touched, and in from one to four hours it will be completely deflexed. Strangely enough, however, drops of water have no effect upon the movement of these dewey hairs. Darwin once studied these plants and fed them beef steak, and they accepted it as intelligently as they would have received crawling insects.

The whole plant is unique, of a light green, varigated with carmine. In July it produces a spike of insignificant white flowers. The spike is generally one-sided, and not more than one full grown flower appears to bloom at a time. This is always topmost on the spike, and opens only in the sunshine. Another common species of *Drosera* is slender, and produce thread-like leaves which curl in upon themselves, with scarcely any distinction between the stalk and the leaf blade.

The southern venus fly-trap (*Dionaea muscipula*), closely related to *Dresera*, is noted for the irritability of its leaves, which close quickly at the least touch. The leaves are basal in a rosette, as in the round-leaved sundew. The trap portion consists of two jaws at the end of the leaves. Sharp, bristling, stiff, thorny hairs are set about the outer edges of these jaws like comb teeth. These tentacles secrete no viscid juices to attract, or hold the insect. The hairs on the inner surface of these lobes are acutely sensitive, and the slightest touch of buzzing wings causes the jaws of the trap to fly together like the cover of a book. The outer comb teeth bristles interlock, shutting off all possibility of exit for the fly. He is caught before he is aware of danger. Small insects often escape, before the teeth close against them. In the prisoner's struggles he disturbs the interior bristles, and the jaws of the trap tightly enfold him. At the same instant a digestive fluid is poured out from the leaf, and the trap remains locked until the insect is digested, when the lobes of the jaws relax,

open, and assume their natural position. Rain and wind have no effect upon the closing and unclosing of the traps of these carnivorous plants.

New York City.

FLOWERS OF LATE AUTUMN.

WALTER ALBION SQUIRES.

THE autumn is peculiarly an American season. Cold waves sweep down from the far north fresh with the ozone of prairie and tundra bearing an indescribable something which tells us that summer is nearly gone and that winter is approaching. After the frosts and gales of the equinoctial period have passed, over rugged New England hills, about the Great Lakes, far out on the prairies and throughout the defiles of the western highlands, there comes creeping a great wave of color clothing the land in the beauty of the autumn woods; the glorious sunset of the year. No other country has the cold waves so characteristic in North America, Indian summer is hardly known elsewhere. In no other land can be found anything to be compared with the beauty of our woods in autumn.

All nature tends to cause the autumn to become a season of reflection, of crowding memories of the dead days "which we have loved long since and lost awhile". The falling leaf, the flight of migratory birds toward their southern home, the meadows brown and sere which so lately smiled in living green, all speak tenderly of the past, and in the mute language of suggestion they whisper of coming change. This spirit of autumn calm, reflective, mingling recollections of the past with hopes of the future, runs through a great part of our American literature.

Our characteristic autumn flowers are chiefly peculiar to North America. The asters and golden-rods, comprising together over a hundred species in the eastern states alone, are hardly represented in other countries. More than a dozen

species of gentians brave the storms of approaching winter and "glimmer out of sleety dew" to bid us good by for the year.

Willow herb, blue sage and sunflowers are among our most common autumn flowers. Throughout the mountains of the northwest the harebell is often to be found in blossom till nearly Christmas.

In enumerating the flowers of late autumn, there is one eccentric child of the underwoods which we must not forget. One fine afternoon, late in October, I was gathering autumn leaves within sight of the blue expanse of beautiful Lake Michigan. I had stopped to examine the yellow leaves of a group of low shrubs, wondering what they were, for I had never seen them before and had been in the country only a few weeks. Soon I noticed that the branches were thickly set with peculiar yellow blossoms. Among the flowers were odd, woody-looking seed vessels, containing shining black seeds. I essayed to pry out one of these, but had hardly touched it when it was no longer there. I tried another when something whizzed past my ear and I heard a faint rattle among the dry leaves some yards away. A strange plant it seemed, indeed, clothed with the yellow of falling leaves and opening blossoms, quietly preparing for another growth of seed and shooting last year's crop into places more favorable to growth. There seemed something familiar about it and my mind went wandering through the labyrinths of memory, digging up the forgotten things of all I had ever heard or read until it turned up something and there flashed across my mind the word witch-hazel.

Besides these true autumnal flowers there are in many localities certain spring flowers which frequently produce blos-

soms in the fall. In this part of the west spring beauties, speedwell, wild geranium, strawberries and buttercups are to to be found almost every autumn.

The flowers of spring being much of joy and expectation, but the flowers of late autumn touch with a tender pathos the deeper emotions of the thoughtful soul; regions where lie thoughts too deep for words; border land of the human and divine where we catch faint perceptions of a beauty eye hath not seen, of a harmony ear hath not heard, of the touch of an infinite hand.

Denver, Idaho.

THE UMBELLIFERS.

BY DR. WM. WHITMAN BAILEY.

THE Natural Order *Umbelliferae*, the Parsley Family, though relatively small as compared with many other groups, is of singular interest and importance. This is due to its strongly contrasted economic features. While it furnishes many condiments, like caraway, anise, coriander, and lovage, it is the source also of a few well-known violent poisons, the true hemlock (*Conium maculatum*), the water-hemlock (*Cicutia maculata*) and fools-parsley (*Aethusa Cynapium*). Others are characterized by pleasant smelling herbage, as sweet cicely, fennel and lovage.

Were it not so familiar a phenomenon, we would all be impressed by observing noxious and innocent plants growing out of the same soil. We see thus how good or bad character may develop from originally the same elements; the result depends upon how these are received and treated. There is, too, an interesting tendency to good or evil, in case of these plants inconvertible. To be sure, in some cases man renders them

innocuous, as with celery or fennel, by bleaching. But it must always be had in mind that this is a dangerous family where-with it is unsafe to recklessly experiment. Two of its genera, say *Aethusa* and *Petroselinum* may be growing side by side, the first "a fetid poisonous herb", the second, freely used on our tables, though mainly as a decorative trimming.

Parsley, by the way has some curious associations with folk-lore. Says Lindley, "it has ever been an object of superstitious observances; for besides its being the assigned plant from beneath which came our brothers and sisters, we remember how it was always considered such ill luck to transplant it, that but few people could be got to perform such an act. It is thought probable that this plant was dedicated to Persephone, as Queen of the Dead, presuming her to be identical with Hecate or Selene, the resemblance of its Greek name (*Selinon*) to that of the last-named divinity at once suggesting its direct derivation from her."

Umbelliferae are closely allied with the *Araliaceae*, which include our ginsengs and sarsaparilla. These plants differ only in their fruits, which are usually fleshy and often poly-carpellary, whereas, as we shall see anon, the Umbellifers, as a rule, have but two, dry carpels, forming together the familiar Schizocarp of that order. In some marked features, they also approach the dogwoods or Cornels.

The plants of this family are markedly of north temperate range, and are especially characteristic of the Mediterranean region and Central Asia. As regards height, they appear to reach their acme in Kamtschatha, where they are almost arboreus in habit. To those who know our great cow-parsnip (*Heracleum lanatum*), it is not difficult to conceive plants of this type reaching gigantic dimensions. In such case, with their ample foliage and immense, broad umbels, they are striking features of the steppe landscape.

Let us now consider their structural characteristics. Usu-

ally herbaceous, the stems are generally hollow, fluted or striated, so as to resemble Doric columns. Sometimes the stems are knotty, fistular, or pithy. The leaves, always alternate, are dilated below into sheathing petioles, familiar to us in celery, where it is these, that by bleaching are made palatable and even delicious. The blade is rarely entire, usually more or less compound or dissected either pinnately or palmately.

It is from the inflorescence that the family derive its name. The flowers are borne either in simple or compound umbels, with or without involucres and involucels, or else, much more rarely in heads, as in *Eryngium*, the peculiar button snake-root of our western plains. These, with their yucca-like aspect, scarcely suggest the family and are sure to be a surprise to the eastern collector seeing them for the first time.

The individual flowers of the family have the calyx adherent to the ovary, and either with five very minute teeth or none. Then comes an epigynous disk, outside of which are inserted the five petals, acuminate, but with the tips so inflexed as to give them an obcordate appearance. The range of color is limited to white, yellow, blue, or lavender, as a rule, and all the flowers are small. In some cases, to a degree in our common carrot, the peripheral florets are somewhat larger than those of the disk and may be abortive. Carrot most commonly has one central flower of a deep maroon color, giving the effect of an insect alight upon the umbel. The function of this solitary floret is not definitely known. It may be an enticement or guide for small flies.

It is from the fact that the flowers are so nearly alike throughout the entire group, that they fail to furnish definite classification features, hence, the fruit and seed only are to be certainly relied upon in identification. These furnish an interesting puzzle to the student. The writer has never considered it fair to dismiss them "as too difficult for the beginner." Possibly that is true for children's classes, but long experience has

proved to me that the average college student soon catches on to the trick of naming them and considers it great fun. To think that a mere half-fruit, properly known as a "seed" is sufficient material with which to certainly name an unknown plant, stimulates his curiosity and desire. Marked attention is always given to these interesting plants.

We will now consider their peculiar fruits or schizocarps, which in ripening from the bi-carpellary ovary, form two mericarps, each the reflection of the other. The student tracing the plant, first settles whether it has simple or compound umbels or heads. Next, he considers the external aspects of the fruit as a whole, its shape, number of ribs, etc. Some of these ribs may extend into flattened single or double wings. A typical fruit has both primary and secondary ribs; these are distinguished by situation. The first primary is on the middle of the back of each carpel. Where the two carpels adjoin is known as the *commissure*. In ripening the halves separate and hang apart on a branching hair-like process, the *gynophore*. Lying between or under the ribs, or in both situations, and may be also on the commissure, are channels, running longitudinally in the substance of the carpel, and filled with a volatile, fragrant oil. These are known as *vittae* or oil tubes. As the number and relative prominence of ribs, wings, and oil tubes are positively distinctive of the different genera, they must be closely observed. For this purpose, a mericarp is sectioned cross-wise, when the ribs appear as prominences and the oil tubes as brown or darkened dots. This section, too, brings out another all-important feature, namely the shape of the contained *seed*, which is flat or flatish, or round; or else semilunar or crescentic in outline.

The beginner must definitely bear in mind that the *whole* object is the fruit; that half of it is a mericarp, and that one seed, observed only in section, lies in each half. He must rid himself of the confusing notion that the caraway or anise

in a cake is a *seed*; it is a whole or half *fruit* containing the seed.

It follows from what has now been said, that Umbellifers must be collected in full mature fruit. Thus only can they be identified. Never send them to a botanist to name in flower only. He can legitimately decline to be perplexed with puzzles and the whole profession will sustain him.

Brown University, Providence, R. I.

ABOUT COLLECTING.

BY M. F. BRADSHAW.

IS there a growing sentiment against collecting? I am not sure, yet there comes a faint recollection of someone scoring mildly the naturalist who collects things. Was it in the pages of our own *BOTANIST*, or have I heard it elsewhere? To be a collector, only, is a small sort of business to be sure, but then it is better than not to be interested in nature at all. One cannot get together a lot of things without knowing something about them, and if one is a student in the real sense of the term, how can he remember all he observes in all the objects he studies? Make notes? To be sure, yet in time what a volume of manuscript to look over whenever he fails to recall some particular feature or when he wants to make comparisons. How much easier, quicker, more accurate to turn to the collection.

All of which assures you that I believe in and make collections. In Botany, my herbarium has been of great value where the species of some genera are so alike, it is hard to tell which is which of some such weeds as the *Chenopodiums* or the *Franserias* or *Baccharis*. Only spreading them out side by side and carefully comparing them will serve to give a clear idea of their differences. But the collection that gives me the most pleasure is the seeds. Herbariums harbor bugs that riddle the cardboard sheets

as though I had fired a load of shot through them, and then sometimes I find a colony of little white grubs all nicely gorging themselves on one of my most choice specimens. Haven't I fumigated them? Surely, and nearly strangled myself with strange and unholy fumes to which I objected with all my soul, but I could not see that the bugs and the worms did; they even thrrove on it.

But seeds are clean, and they stay clean, and they are beautiful to look at; even the most indifferent people admire them. There are those who could not be hired to read a page of botany in print, but they will look through the seed cabinet with delight. I wish I could induce you all to try it; I am sure one season would convert anybody. To interest one of my friends who collects shells, ferns, algae and other things, and who also is a botanist, to try seeds, I finally, after two years of writing about it, asked her to get all the varieties of beans she could and put them in small trays, all of one size, and see if she did not admire the result. To please me, I suppose, she did it, and said in her next letter that she was adding all of the legumes, and the next letter it was nuts, and now I think her collecting of seeds is in full swing and has taken possession. Does anybody think she will care less for plants now than before?

All of the small seeds should be put into vials—or the naturalist's glass tubes—and those larger into pasteboard trays, $2 \times 2\frac{1}{2} \times 3\frac{3}{4}$ inches deep. These trays I make myself, of a light quality of bristol board, covered with white paper. The larger seeds such as nuts and the pits of fruit go into thread boxes—mine are No. 40—covered white also. As I have plenty of cabinet room, I have in some cases put the prettier seeds of medium size in both vials and trays—for instance *Ricinus* beans. As the number and name are the same, it does not make any difference in the catalogue, but is only to add to the beauty of the cabinet. I also let my-

self have all the varieties I can find, as in the beans, I have no less than forty kinds of every color and spotted and blotched; but they are mostly labeled "85 *Phaseolus vulgaris*." This is the gayest drawer in the cabinet, but the nuts are equally lovely.

If any wise man says this is childish, he is welcome to his opinion. Don't we all know it is good to be children once in a while? Whether we call it work or play, I know there is much of botany we will learn in this pursuit, that might altogether slip by us otherwise, because we are always looking for flowers.

The dried weeds are not attractive, and we hardly see them, except to think they are a blot on the landscape; but only when we are collecting seeds do they look interesting.

I commend you all to the study of seeds and seed vessels, and assure you a new world of wonders will be revealed.

Orange, Cal.

OTHER SCOTCH IMMIGRANTS.

BY A. S. FOSTER.

THAT brainy and ubiquitous race on the bleak hills of Scotia is well represented on the northwest coast of America; and, loving his own hills not less, but his opportunity to grow more, he would bring some little reminder of his auld hame with him; so, when he sits down to home making, figuratively squats, on a quarter section, he must have a wee bit of the furze and a sprig of his broom; and they are forthwith rooted in this generous soil.

Scotch Broom (*Cytisus scoparius*) was introduced into Western Oregon about fifty years ago; now, it bids fair to become a prolific acquisition to the diversified flora of the northwest. Having become naturalized it is able to preempt any of the unoccupied territory and, like the fox

glove, (*Digitalis purpurca*) another alien, will locate on the roadside if no better situation offers, and it is permitted so to do, covering unsightly hill-sides and adding to the luxuriant abundance of our flora. Under these circumstances it is liable to usurious rental for the mender of highways is accustomed to use the next at hand to fill up chuck-holes in the road in lieu of other brush.

Its cousin german and next door neighbor is furze, (*Ulex Europaeus*), or ling as one old Scotsman told me, lingering lovingly on the word as though it were a full freighted argosy of youthful and cherished recollections. So homesick for a sight of it that he wrote his old mother to send him some seed "right away off". It is useful as a binder of the drifting sands about Shoalwater bay and on the Ilwaco peninsula where that other Scotsman, David Douglas, in April, 1825, first saw his *Pinus grandis*, (properly, *Abies grandis* Lindley) and picked up *Rubus spectabilis* and *Gaultheria Shallon*. When once introduced it grows in riotous profusion and can be found in many localities from Vancouver Island southward to Point Arena, California.

There is a small tract of two or three acres near a certain "little red school house" contiguous to a village called Sunshine, although the house is now yellow and often the fog-blankets are full width and four thicknesses, yet the furze occupies this common to the exclusion of much of the other coastal shrubbery. Our western humming bird, *Selasphorus rufus*, has colonized this forest of furze making it an annual breeding place. About the first of June any youthful chum could show you a dozen nests, about breast high, very little effort being made at concealment, wherein were eggs or fledgelings while scores of solicitous parents were hovering almost in reach or darting hither and yon in an attempt to draw your attention from their tiny nests. From mid-January to mid-summer the bloom is very profuse, which

attracts millions of insects upon which the birds feed. In the struggle for possession as the furze keep down other intruders so do the rufous humming birds drive away other feathered intruders. It is very interesting to watch the love-flights of these feathered gallants while you inhale the fragrance of the scented air.

Portland, Oregon.

NOTE AND COMMENT

GOLDEN Currant IN OREGON.—*Ribes aureum* is found along the banks of the Columbia and Walla Walla rivers, about Wallula, Wash. Prof. Sheldon thinks that it is quite probable that it was distributed westward from Missouri by the Lewis & Clark expedition.—*A. S. Foster, Portland, Oregon.*

A LARGE ARISAEMA.—In the Catshill mountains, in June 30, was found a giant specimen of a Jack-in-the-pulpit. A division of the leaf measured eleven inches in length, and seven inches in breadth. The spathe was seven inches long. The leaves had the effect of a large umbrella.—*Miss Mabel Dimock, Peekamoose, N. Y.*

GERMINATION OF AMERICAN LOTUS.—In writing of the germination of the American lotus seed, you say, on page 17 this volume, that "growers of these plants usually file a hole through the seed coat to allow water to enter when they wish to hasten germination." I have had some experience with the germination of these seeds, and find if they are put into water and rich mud while still fresh they will germinate and throw out leaves in about 25 days. This is nature's time, and method of planting this fruit. In the wild state, by the time the

"acorn" have matured in the torus, the flowering stalk has become weak and bent over, so as to allow the ripe fruit at the top to fall into the mud and water, when germination may at once begin. Several young leaflets may be thrown out and the new plant be well on its way before the cold season sets in.—*J. Schneck, Mt. Carmel, Ill.*

COLOR OF BUDS AND GROWTH.—Vegetation does not awaken in spring until sufficient heat has been received by each plant to revive its dormant protoplasm. The amount of heat necessary for this differs with the species being usually greatest in the species with southern affinities. Small differences often have a considerable effect in this matter, and in the buds of our forest trees so slight a thing as the color of the bud-scales plays an important part in their development. It is well known that dark colors absorb more heat than light ones, and it is the rule with our trees that those with dark buds are first to show leaves in spring because they have been able to secure more warmth because of their color.

OBJECTS IMBEDDED IN TREES.—A recent item in a local newspaper, referring to the finding of an iron chain, embedded within the trunk of an old cherry tree, reminds the writer of several instances near at hand. I often pass a red maple (*Acer rubrum*) through the trunk of which, about twenty inches below the crotch, a log chain is hanging. Since the placing of the chain in the tree fork some years ago, the enlarging, diverging branches have simply come together at their bases, and the soft sap wood has more or less united, making a continuation of the main stem. The chain literally passes through the middle of the trunk and could not be removed without splitting the tree in half. A river birch (*Betula nigra*) was noticed not long ago along the shore of the Chesapeake, with the bleached remains of a fisherman's clay pipe protruding from its side. Here at one time had been the crotch in which it rested. Birds and squirrels are much ad-

dicted to leaving objects in these arboreal resting places. While felling some trees several years ago the writer found in the heart of a post oak (*Quercus stellata*), a curious collection of cherry stones, and the shells of hickory nuts. They occupied the centre of the bole and were a foot or more below the then present crotch. Some of the shells had been split open by action of frost before finally becoming enveloped between the expanding branches. The cavities, where once kernels had been, were found to be tightly packed with the soft cellular tissues, comprising the newly formed bark and wood.—*J. Ford Sempers, Aikin, Md.*

A FREAKISH DATURA.—A curious departure from the regular forms of one of the Solanaceae came under my observation late last summer. Among the *Datura meteloides* I found one so entirely different from this species, yet undoubtedly belonging to the family that I considered it worthy of note. It grew in the same sprawling fashion as does the *meteloides*, but its foliage was smaller and more finely divided. The fruit was smooth, not the least prickly, and the blossoms were most peculiar; the calyx was spathe-like, the corolla united *only* at the base; the lobes hanging down in the same fashion that the lobes of the common *Datura* would hang if they were torn apart and left hanging from near the base. In color and odor it resembled the type, but the listless, lazy-looking petals are a curious travesty on the crisp funnel-shaped corolla of the *Datura* that grows in such profusion along the roadside. I gathered the unopened buds and let them open in the house, sheltered from wind or sun, so there cannot possibly be any mistake about the blossoms. Except the *Datura meteloides*, the only Solanaceae growing near was *Solanum Douglasii*. From whence came this strange hybrid, (if hybrid it is). California produces many curiosities among her plants, so many in fact that one can but wonder if this be Nature's experimental garden, where she not only produces puzzling

novelties, but strange freaks and curiosities.—*Elizabeth A. Lawrence, Los Angeles, Cal.*

THE MULLEIN IN OREGON.—I have found the mullein (*Verbascum thapsus*) for 250 miles up the Columbia River from Portland. It seemed to have been established in the early settlement of the country, perhaps by the Fur Traders at the old post of Wallula, Wash., where David Douglas lived in 1825-26.—*A. S. Foster, Portland Oregon.*

NEW BOOKS ON BOTANY.—We all like a new book on plants and though we may buy every one advertised that appeals to us, we still crave another. I have just become the happy possessor of two new ones, by the simple method of getting bound the first eight volumes of the AMERICAN BOTANIST. Four volumes make a book of nice size. To look through them and browse here and there is almost the same as having something quite new, for where so many things are worth remembering, who could have kept them all? Try it.—*M. F. Bradshaw.*

THE AMERICAN HOP-TREES.—In many localities the hop-tree (*Ptelea trifoliata*) is a familiar object. It is especially noticeable in autumn when the clusters of yellow winged fruits, like exaggerated elm-seeds are ripe. These fruits contain a bitter principle and have been used in brewing, hence the common name. Besides the hop-tree of the Eastern United States, four or five others are reported as common to our Southwest. These latter species, with the addition of a few from Mexico, have given Dr. E. L. Greene the excuse for publishing a paper in "Contributions from the United States National Herbarium" in which about a dozen species are expanded into no less than fifty-nine. We have often contended that by accepting insignificant characters as of specific value, a great number of species could be made out of any plant group, such

as the maples, buckeyes, birches, etc. Dr. Greene seems to have proven the truth of our contention, but it is to be regretted that the National Government has concerned itself with species-making of this nature.

PRODUCTION OF VANILLA.—Among the ten thousand or more species of orchids in the world there are few that are commercially valuable except for the beauty of their flowers. A conspicuous exception is the vanilla from the seeds of which the well known flavor is obtained. During the past year, no less than four hundred and twenty tons of vanilla reached the market, the principal supply coming from the tropical islands of the old world.

THE PEANUT AS FOOD.—The little peanut that only a few years ago was considered by physicians as unfit to put into the stomach, is now the basis of food products of one of the largest sanitaria in the country. Analysis proves it to contain three times the nutriment of beef, hence as it becomes better known and its value realized it enters the bill of fare in the shape of peanut butter, salted peanuts, soup, cakes, etc. Many vegetarians through the country use no other bread lubricant than peanut butter, which has been prepared from the roasted nut.—*American Nut Journal*.

AN EPIPHYTIC VIRGINIA CREEPER.—In the crotch of a large locust tree (*Robinia Pseudacacia*), near my home, a thrifty plant of Virginia creeper (*Ampelopsis quinquefolia*) has been growing lustily for some years past. When first noticed the main stem was less in diameter than a lead pencil. The plant was then probably several years old. In the eleven years that have elapsed since its discovery, the stems and lateral branches have become much longer, some of them an inch and over in diameter. They trail to within a few inches of the ground, and have climbed thirty feet to the top of the tree. The plant makes a vigorous growth each year, though it has no possible connection with the ground. Besides de-

composed leaves, and other vegetable debris likely to accumulate in a tree crotch, there must also be a decayed portion of the trunk within reach of the creeper's roots, from which additional supplies of plant food are available. However that may be, the plant appears perfectly normal blossoming and fruiting each year, and in every respect, behaving as its neighbors do, whose roots are in the soil.—*J. Ford Sempers.*

ANOTHER SOAPWORT.—I have been interested lately in a plant bloom, the root of which the Mexicans make use of for soap, as it is quite saponaceous. It is *Chenopodium Californicum*, a perennial. The leaves have a little of the same quality and I have raised about as much lather from them as from bouncing bet. I have wondered whether this same saponaceous quality may not exist in our eastern *Chenopodiums*. Don't you want to look this up during the pigweed days this season? Those with perennial roots would perhaps be the most likely. *C. Californicum* has a root a foot or two long, which makes quite a respectable cake of soap.—*C. F. Saunders, Pasadena, Calif.*

THE YELLOW FRINGED ORCHIS.—The editor of the *Florida Agriculturist* reports finding the flowers of the yellow fringed Orchis (*Habenaria ciliaris*) of all shades of color from deep orange to pure white. The plants with white flowers are usually considered to belong to a separate species, the white fringed orchis (*H. blephariglottis*), but since the chief distinguishing mark of the two so-called species is the unreliable one of color, it has often been suggested that they are but forms of one species, just as the two color forms of the meadow lily (*Lilium Canadense*) are known to be. Some plant student desirous of some experimental work might sow all the seeds from a spike of the yellow fringed orchis and bringing the resultant plants to maturity, note whether any of the seedlings produced white flowers. If so, the identity of the two might almost be considered established.

EDITORIAL

A large number of our subscribers have written to say that they have not received copies of the July and August numbers of this magazine. For the sake of these and others who may contemplate writing, we beg to say that last June we adopted the policy of omitting the numbers for July and August of each year. At the same time we increased all the other numbers of the magazine by four pages each so that subscribers will receive just as much for their money as formerly, only arranged differently. The volumes now begin in September and February and consist of five numbers each. The vacation habit has grown so prevalent that many of our readers are not at home through the heated term and the magazines in consequence are often mislaid or lost. We are inclined to think that the majority will favor this new plan of issuing the magazines in the months when they have more leisure to read. Indexes have been issued for volumes I to IV and for volume X. The others will be issued as soon as possible and mailed to all subscribers free.

* * *

The agitation in favor of a rearrangement of the rates at which magazines and newspapers are carried in the mails has resulted in the exclusion of *American Ornithology* from the second-class mailing privilege. The extra cost of mailing the magazine, which this necessitates caused the publishers to suspend publication. The magazine was one of the best of its class, and we regret very much to see it cease publication. The *Amateur Naturalist* has also fallen under the ban, but its editor keeps steadily on his course with no thought of suspending.

* * *

Each month, before the numbers of this magazine are sent out, three hundred copies are reserved for making into complete volumes, and yet, so lively has been the sale of these, that

the supply of some volumes has been reduced to less than a hundred sets. Many people imagine that in selling its back numbers, a magazine is getting paid for practically worthless stuff. This may be true of the magazines whose contents are of temporary interest, but all technical magazines are worth preserving and reading again and again. The contents of THE AMERICAN BOTANIST consist of interesting and pertinent facts. A hundred years from now they will be just as significant as they are at present. They will bear frequent reading for no one can carry all this information in his head. They will form a better encyclopedia of economic and ecologic botany than can be found anywhere else for the money. And less than one hundred more persons can hope to own a complete set! Our offer to supply free the numbers missing from subscribers files is hereby withdrawn for all volumes preceding volume nine. The supply is exhausted.

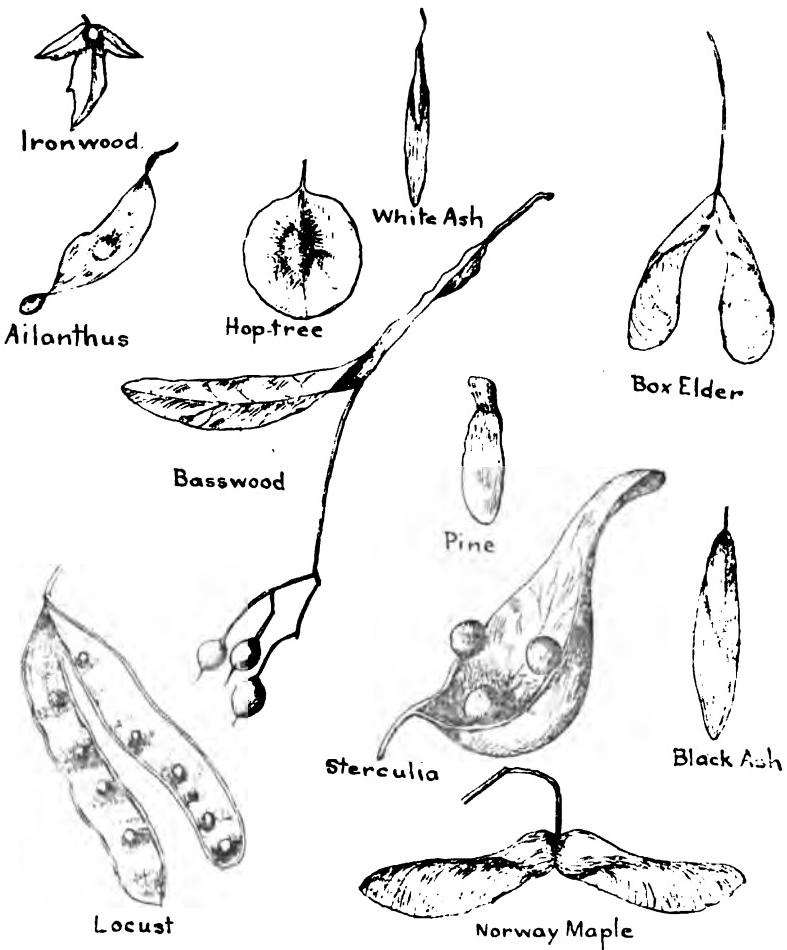
* * *

Occasionally we have a dissatisfied subscriber. One such recently ordered his subscription stopped and added: "There seems to be no common language in which we can talk about plants intelligently unless we have made a study of them and this I cannot find time to do." This again points to the fact that the common language of botany is almost a separate dialect and raises the question whether a magazine can be made at once so clear in expression and so interesting botanically as to secure the requisite number of subscribers to make it a paying enterprise. An examination of the most "popular" guides to botany will show a vast number of technical terms which must be understood before the book can be. These terms, however, soon become familiar without conscious effort if one attempts to use the guide and since this is so, it does not seem worth while to make a magazine too untechnical. A few puzzles in one's reading is good for anybody and the very acquiring of the facility to use botanical expressions increases one's vocabulary immensely. Incidentally, however, the readers of this magazine will note the rare company they are in if able to understand its contents.

BOOKS AND WRITERS.

Still another "How to know" book has appeared. This is entitled "Mountain Wildflowers of America" and is written by Julia W. Henshaw. Our country is now so well covered with books for identifying the wildflowers that the book is rare indeed that finds a phase of the subject intouched. The present volume, however appears to be one of this class. It deals principally with the plants of the western mountains, but includes practically all that are found in elevated regions throughout the country. A few plants are also included that are not normally mountain plants such as the common buttercup, ox-eye daisy, pigweed, marsh marigold, and sweet clover. The book follows the accepted form for such things—the common and scientific names, a technical description of stems, leaves, flowers and fruits followed by considerable matter of popular interest on a wide variety of subjects related to the matter in hand. The illustrations, one hundred in number, from photographs by the author, are of uniform excellence and of themselves worth the price of the book. The book will be most usable in the northern Rockies. Nobody visiting that region on botanizing bent should be without a copy and those in other mountain regions will find it desirable. (Boston, Ginn & Co., 1906. \$2.00 net).

Margaret Slosson's "How Ferns Grow" is a book for the student of fern structure rather than for the cultivator of these plants. It consists of forty plates, illustrating the changes that take place in the fronds of some eighteen species of ferns from the sporeling to maturity with more or less explanatory text. The illustrations are illustrative though not very well done, and the text is not as lucid as it might be. Taken altogether however, it is a book that will be of some considerable value to fern students, but one that is not likely to have a very extended sale. The author has followed "The American Code" of Nomenclature, this apparently being the title of the style of nomenclature favored at New York and Washington. In this book *Asplenium ruta-muraria* will be found under *Belvisia ruta-muraria*. (New York. Henry Holt & Co., 1906. \$4.00 net).



WINGED SEEDS.

THE AMERICAN BOTANIST

VOL. XI,

JOLIET, ILL., NOVEMBER, 1906.

No. 3

WINGED SEEDS.

BY WILLARD N. CLUTE.

NATURE has adopted many ways for distributing and planting her seeds. There are seeds cunningly hidden in a juicy pulp to beguile the birds to distribute them; there are seeds with artfully contrived hooks and barbs designed to hook into the clothing of mammals and thus be transported to other regions; there are seeds with a variety of silky parachutes with which they may go ballooning on their own account, but in none of these contrivances has the mother of all shown greater versatility of invention than in the fashioning of her winged seeds.

The winged seeds are not simply equipped with an expanded portion to aid them in sailing down the wind. Many other things must be attended to. The seed must be weighted just right and properly placed with regard to the center of gravity; the wing must be so set to the breeze as to ensure that the seed will be carried a long distance, and various ingenious contrivances must be devised for sustaining the weight of the seeds in the air as long as possible. There problems, which still puzzle man in his own efforts at aerial navigation, have been solved again and again by Nature and each time in a different way as if to show the multiplicity of her resources. In imagination one may look back through the untold centuries and see her trying this and that invention. We see how the seeds not properly adjusted to all the conditions dropped beneath the parent tree and were crowded and starved out as miserable failures while those more perfect fared on into new territory, there to reproduce a new plant and more seeds as perfect as the original. Then, too, a judicious selection had

to be made of the plants to bear these seeds. The burs, the berries, the ballooning seeds might be borne near to the earth, but seeds that were to be launched on the breeze had to be hung high in air to ensure a good start and as long a distance as possible from the ground.

Since the pines, spruces, and their allies are among the oldest of seed-producing plants, the pine-seed is doubtless of one of Nature's first creations in winged seeds. In this the wing is thin like that of an insect and made from the outer coat of the seed. Primitive as it is, the immense coniferous forests spread over the globe attest to its efficiency. It does not merely fly with the wind as a bit of paper might. When let out of its scaly casket it begins forthwith to spin about with the center of the seed for an axis and thus retards for a minute or more its descent from the treetops to the earth. Meanwhile the breeze, be it ever so light, has borne it on to new opportunities for growth and development.

The ash key is fashioned after the pattern adopted for the seed of the pine, but here it is the ovary instead of the seed coat that is produced into a wing. The seed or rather the fruit, since this is a ripened ovary, spins in much the same way, in a plane parallel to the surface of the earth, and so comes slowly to its final resting place far from the parent tree. It is interesting to note how the various species of ash have varied the pattern of their fruits from the slender oar shaped key of the white ash to the broader clumsy pattern of the black ash, and yet all are equally effective in flight.

So characteristic is the winged fruit of the ash and other trees, that a special word, *samara*, has been coined for it. The samara is the badge of the ash and maple families, the ashes bearing their keys singly and the maples in pairs. By this sign the unmaplelike box elder shows its kinship with far nobler trees. Of slightly different pattern are the rounded samaras of the elm and hop tree, each with its single seed in the

center, but they are samaras none the less. Of this latter type, with the seed in the center of the wing, we have a most ingenious and remarkable example in the twisted samara of the Chinese tree-of-heaven (*Ailanthus*). These samaras are borne in great bunches with each samara on its own tiny stalk. When they release their hold on the tree, even on a quiet day they begin to revolve rapidly upon thir long axis and moving hither and yon like a flock of birds in flight dart away to pastures new. Even after reaching the earth, a gust of wind catching their sails often carries them much farther.

Possibly just to show her independence of a single method, nature has equipped the cluster of basswood seeds with a sail or wing made of a leaf. When the blossoms appear, there appears with them a narrow green wing or bract, which is fastened by its midrib to the common flower stalk for about the first half of their respective lengths. During the summer this broadens and toughens and its tip spreads out at such an angle to the flower stalk that when released from the tree in autumn a whirling motion is set up that most effectually retards the descent of the fruit cluster. Without doubt this is nature's best parachute. Since the number of fruits in the cluster varies, one may wonder whether the angle formed by the bract with the fruit stalk is calculated from the weight of seeds to be carried. One may easily see how very much the wing adds to the seed cluster's buoyancy by simultaneously dropping two seed clusters from a height after the bract of one has been removed. The bractless one drops like a shot; the other very leisurely reaches the earth. The seeds of the blue beech or ironwood (*Carpinus*) are also equipped with a bract, but in this case each seed has its own bract, a three-lobed object, which helps in dissemination, but which appears to be far less effective than the bract of the basswood.

From the changes which are rung on the modified ovary as a source of winged fruits, we may infer that this is nature's

favorite method. She returns to it again in the locust family wherein the ovary is made to serve as a wing for not one, but many seeds. If we open a locust pod just before maturity, we may wonder why the seeds cling so tenaciously to the pod. The seed stalk seems out of all proportion to the needs of the seed. But the use of all this is found when the pods ripen. At maturity they split open like the pods of the common bean, but the locust bean does not drop out of the pod as common beans do. There the two halves of the pod hang on the tree with their seeds clinging fast, until a gust of wind carries pod and all away turning it over and over as it goes. Whether the seeds eventually drop off here and there I have never been able to discover. Many of the pods hang on the tree until the snows have fallen and then falling on the snow crust may be blown for long distances. The locust, however, does not always grow where winter snows are deep, and this trip over the snow was apparently not planned for when the means of transportation were evolved. It may be questioned whether in the making of locust-pods, evolution has been influenced much by the usefulness of the pod in distributing the seeds. The long twisted pods of the honey locust are too heavy to be whirled away by the wind, but they may be rolled over and over after they have reached the earth. But the coffee tree with pods thick and woody and seeds like bullets firmly attached, though built on the plan of the locust pod was plainly never meant for wind distribution.

Still more curious is the fruit of *Sterculia platanifolia*, which Mrs. Bradshaw has recently sent me from California. This produces clusters of ovate ovaries in which are borne two or three seeds as large as peas. When ripe the ovary splits down on the side upon which the seeds are located dividing the seeds so that there are one or two on each edge and forming a shell-like structure like the vanes of an anemometer. In a

stiff breeze this is whirled over and over, even after it has come to earth and losing a seed here and there soon plants the crop.

MOUNTAIN MISERY.

BY CHARLES FRANCIS SAUNDERS.

BY this alliterative title is sometimes called a pretty little evergreen shrub of the middle Sierra region of California, where in sunlit, coniferous forests it often covers immense areas with a dense carpet of dull green, which looks at a short distance like a sown turf. The branching, wiry stems are about a foot high and are clothed with an abundance of finely dissected leaves, amid which throughout the summer an occasional solitary white flower is borne, resembling a strawberry blossom. Like the strawberry, indeed, the plant is a member of the rose family, and is botanically known as *Chamaebatia foliolosa*—a name familiar to readers of John Muir's works, who speaks of it sympathetically in "Our National Parks."

The leaves are so fern-like in appearance that it is said that an old lady of one of the foothill towns, who added to her income by selling pressed flowers to tourists, used to palm off bits of foliage on the uninitiated as fronds of a peculiar fern of the region.

"But why Mountain Misery?" you ask. Upon plucking a few leaves of the plant, you become conscious of an indefinable, pungent odor, somewhat of a cross between that of tobacco and fresh paint. Then you notice that your hands are discolored and begummed with a sticky resin which dots the leaves, and, if you do not observe it then, you will later. Your clothes, wherever they have come in contact with the plant, are liberally smeared with the same substance; so that if they are of a delicate fabric, it will be a nice matter to restore them to their original estate. "So", you think, "misery enough", and deem the plant well named.

Cattle frequenting land where *Chamaebatia* is abundant, are said to get their bells so gummed up with its tarry exudations at times, that the metal no longer makes a sound. Mountaineers often call it tarweed—a generic term, like greasewood, applied in the west to many plants of quite diverse botanical families.

Pasadena, Calif.

OBJECTS IMBEDDED IN TREES.

BY PROF. C. E. BESSEY.

SPAKING of objects imbedded in trees on page 41 of the October BOTANIST, reminds me of an odd specimen I have had on my table for a month or so. It is a section split from a stem of a lodge-pole pine (*Pinus murrayana*) in which are imbedded several cones of this species. The piece of stem from which the section was split was a foot long and about four inches in diameter at the base, and about three and a half inches at the upper end. In this section, which is not more than one-fourth of the whole stem, there were imbedded six cones, each about an inch and a half long and an inch in diameter. When the stick was cut, the cones were almost covered with wood, only their tips being visible through the small holes which still remained. Had the growth of the wood not been stopped, the cones would have been completely covered.

The lodge-pole pine is remarkable for the tenacity with which its cones hang on, according to Sargent, "usually remaining closed for twenty years." These cones in my specimen remained so long that the wood grew over and enclosed the cones. A careful count of the annual rings at the base of the stick showed fifty rings, so that it is certain that these imbedded cones must have formed about fifty years ago. Whether the seeds (which are still in the cones) still retain their vitality is quite doubtful.

It is interesting in this connection to mention the fact that when a fire sweeps through a forest in which there are lodge-pole pines, the heat causes the cones to open within a short time after the fire has gone by, and the seeds are therefore on the cleared ground very early. By next year there is a myriad of little pine seedlings on the ground, excluding and smothering out every other thing. I have seen many such exclusive thickets of these young trees in the Yellowstone Park, where this tree is found in great abundance, often to the complete exclusive of not only all other trees, but of every other kind of vegetation as well.

University of Nebraska, Lincoln, Nebr.

COMMON THINGS.

BY M. F. BRADSHAW.

LET no one ever give over the study of botany for want of new material. True, a new plant to examine is the most delightful thing in the world, and nobody but a botanist quite knows all the pleasure of it. But, do we all know all about the everyday flowers of our gardens? Longing to botanize and not being able to get out into the wild country where my heart has been all the spring, I begun to look at the garden flowers with an eye to something besides their decorative beauty. Why not examine them all, just as if I had never seen them before and they were so strange that I must use the key?

Well, the first lot I gathered numbered ten, and by the time I was through with them, looking carefully at every part with the help of a lens, my mind was made up; I would study botany in the garden. Such lovely things I saw. I was filled with delight, and then I learned some new features that I had never observed before. For instance, in the Geranium family. They are among the common things here, and there are now in bloom the zonale, the "Lady Washington", the ivy leaved,

the rose geraniums, the nasturtiums, the oxalis, each of these species in several varieties. I do not know that I ever did examine them all, all through, before; if I have, I overlooked one curious thing. The nasturtium has a spur and it always seemed a very distant relative, since it had to be considered one of the family; but I found a connecting link that made it as near as second cousin to the zonale geraniums. The pelargonium comes between the two, its general effect being most like the geranium, but in detail there are the two upper petals larger and with lines of dark color in the throat like the nasturtiums, and it has the spur. I never saw that before, but the key in Gray said it was there, so I looked for it. One sepal is larger than the others and it is prolonged into a spur which is adherent to the pedicel. This was not hard to find when one knew it was there, but surely the other geraniums have no such appendage! Look closely at the slender pedicels; there is a hollow side—a spur really—running down one side nearly to the end. It is in them all, hard to find, almost absorbed, but it is there. Now think of that for a botanist to have missed! Or do I assume too much when I call myself by that honorable name?

How many of us have a picture in our minds of the arrangement of the stamens in the Bignonia family? I have on a pergola *Tecoma jasminoides* and on an arbor *Bignonia venusta*, both perfectly grand, each one willing to take the place and doing its very best for it, and actually would smother the house and us if not kept within their own territory by constant pruning. They are supposed to take turns, the *Bignonia* blooming through the winter months, the *Tecoma* in the summer, though both are in bloom much of the time and there are always some flowers on them both. So I have admired, I have praised, I have loved them; I have given away the flowers and the roots to all who would take. I thought I had fully sounded their depths and that the bignonias were such

dear intimate friends, I knew them through and through. I did not, and now I know I never will, nor will I know any other flower friend any more than just a little way.

Look at the grace of the stamens in *Tecoma jasminoides*; has any other flower hit on anything quite so lovely? And with all the countless blossoms overhead, for years past, I never have seen it till now.

I still want to go to the hills, but I intend to study botany and the garden will be an ample field for me, for I suspect every old friend in it has a secret I can find out, and it is sure to be a charming one.

Orange, Cal.

OUR POISONOUS PLANTS.

BY DR. WM. WHITMAN BAILEY.

OUR native plants, poisonous to the touch, are only two in number. These are the common species of *Rhus*, the *R. venenata* and *R. toxicodendron*, with its varieties. The fruit is variously called "poison dogwood", "poison oak", and "poison sumac." The last is the best name for it, being according to facts. It is a sumac. The name dogwood, properly belongs to a very different series of plants, namely, to the cornels, of which *Cornus florida* and bunch-berry (*Cornus Canadensis*) are examples of one type. There is another series—as in the osier dogwood, (*Cornus stolonifera*)—that lacks the ornamental involucre which makes the first two, so beautiful. These cornels are all innocent, but, from confusion of names, are avoided by many as presumably noxious.

Rhus venenata grows in swamps or moist places, and is a small tree, from eight to twenty feet high. It has a smooth gray bark and very large, handsome pinnate leaves, the leaflets entire, glossy, and acute. In autumn they color gloriously and with a great variety of tints, scarlet, crimson, yellow, and maroon. Red is the favorite shade, and even when the leaflets are green, the rachis is red.

So splendid are these leaves, that every year, they, Siren-like, lure many victims, if not to destruction, at least to much misery. For it is a serious thing to be poisoned, and the susceptible are never exempt. Indeed, one poisoning seems to render them more liable to another. Certain persons are affected by mere proximity to the shrubs. The smoke of the bush when burning will poison others. It is said, indeed, that a few people cannot handle gum copal, or anything coated with shellac, the copal being made from an oriental *Rhus*, which is poisonous.

Many remedies have been suggested or tried. Chlorinated soda, applied as a wash is good. A quick application of alkaline water, or a weak solution of alcohol may be effective. A regulation of the diet, too, is of advantage. The poison is probably acid and needs to be washed off or neutralized. Experience shows the plants to be especially dangerous when in flower, or, at least, this is a very common belief. Elaborate experiments have been performed at the Harvard Medical School and elsewhere, to determine the nature of the poison and its best treatment.

Rhus venenata is much more dangerous than *R. toxicodendron*, but is is a curious fact that many persons, like the writer, are exempt from either. The great botanist, Michaux, however, warns people, that even those who had for half a life time considered themselves exempt, might finally succomb. This may depend upon changed conditions of the system. As is well known, there are certain persons who cannot handle strawberries or wild carrot. Fortunate is the botanist who, like Gallio, "cares for none of these things."

The flowers of both our poisonous species of *Rhus*, come early in the season. They are greenish, and not unlike those of the grape, to which the family (*Anacardiaceae*), is nearly allied. The fruit in the poison species is gray, while innocent sumacs have red berries.

The poison ivy is often mistaken for the Virginia creeper or woodbine (*Ampelopsis quinquefolia*). From this it may be distinguished by its three leaflets, of irregular outline, its root-clothed or hairy stems, and gray berries. We say gray. They are rather a sickly yellow. *Ampelopsis* climbs by tendrils which are attenuated stem axes. Each tendril is capped by an adhesive disk or cup. The poison ivy, on the other hand, clings by its aerial roots.

In cross section *R. toxicodendron* shows eccentric rings, the pith lying close to the less-exposed side, or nearest the supporting object. The leaves color gorgeously in autumn, assuming shades of orange, yellow, scarlet, or crimson. Flung high over some elm or evergreen, the trails are extremely brilliant.

Both of these dangerous plants are all two frequent. State laws or municipal ordinances are powerless against ivy. In the city of Providence, it prevails on some of our principal streets; one sees it everywhere in Newport and about Narragansett Pier. Indeed, near the salt water resorts it seems to especially thrive. No one can tell how many persons annually suffer from it. Over and over again the writer has pointed out the two shrubs, or written about them in the public prints, but no action appears to be taken against them. Like moths to the candle, the victims return.

So much for our own tactile poisons. There are those who proudly claim to be poisoned by parsnips even. Science does not deny this, but waits for proof. Is it not true, that a few (white) people are made sick by melons; yet shall we forswear neither the luscious cantaloupe, nor the succulent watermelon? It is only right to mention the plants that are poisonous in the other ways than by touch. Of these there are many. Some buttercups are sharply acrid; the monkshoods or aconites violently poisonous; the fox-glove also; while the leaves and rootstocks of mandrake (*Podophyllum*) are to be

avoided. This last plant, also known as may-apple is very common in the Middle States. In early spring it sends up from its vigorous creeping rootstocks, a series of bud-crowded stems. Those that are to bear flowers have two leaves, between which is the spherical flower-bud, which as it prepares to open, droops and hides under the umbrella-like foliage. The barren stems bear but one peltate leaf, ample and handsome. The snow-white, waxy flower is large and showy. It is succeeded by a juicy sub-acid berry, which Gray speaks of as being "eaten by pigs and boys."

The bloodroot as its name implies (*Sanguinaria* in Latin also), has a murky, gory-looking fluid in its rootstocks. It is acrid and used to some extent in medicine; not dangerous probably.

Buckthorn is a very common shrub or small tree in New England. It bears clusters of black cathartic berries violently purgative. No plant of the *Leguminosae* at the East, seems actively poisonous, but on the plains of Indian Territory, Kansas, Nebraska, etc., grows an *Astragalus*, the "Loco" or "crazy plant", very dangerous to cattle and horses. The wild senna (*Cassia Marilandica*), can be used much as is the officinal drug senna. The two little sensitive plants, *C. chamaecrista* and *C. nictitans*, probably have similar qualities.

As regards the Rosaceae, we would suggest that it is not safe for everybody to eat too much of the leaves and bark of wild cherry. It is hydrocyanic acid which imparts the toxic quality to this plant and to the leaves of laurel or *Kalmia*.

We must now speak of a group of plants which contain many poisons, as well as many edible plants and condiments. It is the parsley family or Umbelliferae, known, as a rule, by their umbrella-like flower-clusters of white, yellow, or lavender blossoms and by their peculiar fruits. It is by their fruits, indeed, that they are distinguished from each other. The edible plants of the family are parsley, parsnip, celery, cori-

ander, lovage, caraway, anise, etc. Some of these, even in the wild state, are active poisons. It never does to fool with them. The pronounced poisons are the swamp or water-hemlock (*Cicuta maculata*), very common, the true hemlock (*Conium maculatum*) occasional and known by its mouse-like odor, spotted stems, white flowers and parsley-like leaves; and fools parsley, (*Aethusa cynapium*), sometimes found in waste places. The last two are horribly dangerous, but we say again in regard to them all, be careful. Do not try experiments with them, if they invite eating. *Conium*, by the way was the "Hemlock" of classic history used to eliminate undesirable friends or too active politicians.

Lobelia inflata, Indian tobacco, is a "noted quack medicine", and generally reputed poisonous. However, I knew a reputable doctor of the old school who always maintained to the contrary and cited how he had used it with impunity. It will be recalled on the authority of Darlington that quacks called the cardinal flower "highbelia" in distinction from "Lowbelia", the Indian tobacco !

In Ericaceae we have the mountain-laurel, (*Kalmia latifolia*), and the smaller *Kalmia angustifolia*, or "lamb-kill", about the noxious properties of which there is little question, I have been told that an infusion of the leaves of either of them forms a good fly poison. I have never tried it,

The foliage of *Andromeda Mariana* is used in a similar way. Then there is the bear-berry, (*Artostaphylos uva-ursi*) employed in medicine. It literally carpets portions of Rhode Island, and with its pink urn-shaped corollas is as pretty nearly as *Epigaea*.

The nightshade family, *Solanaceae* is one of which the botanist is always shy. It boasts among its useful plants the potato, tomato, egg-plant, cherry-tomato and tobacco. The last, useful and grateful beyond question, has also to be classed as noxious. Like some others

of Nature's benefactions, it is to be employed in moderation. The true nightshade, (*Atropa belladonna*), we do not have in America, unless as a rare escape. I have myself never seen it growing but twice, but the bitter-sweet nightshade is popularly called the deadly, and is especially dangerous to young children, owing to its brilliant, red, almost translucent berries, and pretty, blue, potato-like flowers. The plant spreads over stone walls, fences, and copses, and is highly ornamental. Its little cousin, the black nightshade, (*Solanum nigrum*) is often seen in old farm yards. It has dark berries.

Much more dangerous than either *Solanum Dulcamara* or *S. nigrum*, is the thorn-apple or "Jimson weed", (*Datura stramonium* and *D. tatula*). These rather bushy, but still herbaceous plants, strikingly ornamental and hence much used by artists and designers, are found on ash-heaps and in waste places throughout the Union. They are said to be of tropical origin. The first has large white, funnel-form and convolute corollas; the second is in every way smaller; and with violet-tinted flowers. Both have a coarse evil smell, yet every year deaths from them are reported. The seeds, treated in alcohol afford a solution, which according to whether viewed by reflected or transmitted light, is green or a rich red. This plant, handsome as it is, always indicates a lack of thrift, and on that account as well as its dangerous nature, should be uprooted wherever found.

As a rule it is well to avoid chewing any plant endued with a milky juice; hence, I should be suspicious of uncooked stems of milkweed or dogbane. The asclepiads in a very young state, however, are used in some places as salads. *Vincetoxicum nigrum* a near relative of these, a plant with small livid flowers, and a repellent odor, a sprawling climber, escapes now and then, and is abundant at West Point, N. Y., and Cambridge, Massachusetts.

If pokeweed (*Phytolacca decandra*) is not poisonous, all the better, for its fine strings of ink-filled berries are very

tempting to children. They certainly have a dangerous look, but so far, though often in stress, I have not been compelled to eat them.

The Euphorbias are all poisonous with acrid juice, generally milky. We have many of them, especially at the west where they become handsome, like the well-known "snow-on-the-mountains", (*E. maculata*). The "tread-softly" (*Cnidosculus*) of the Southern States stings worse than any nettle or jelly-fish. This is saying a good deal. Croton and castor oil belong to this family. Common nettles (genus *Urtica* and some nearly related wild genera), poison by means of actual stinging hairs, provided with a poison bag. It is a suggestive bit of thought to reason out, how, by selection, such a provision has come about, as I am disposed to think it did.

Every one knows the acridity of the corm of Indian-turnip or Jack-in-the-pulpit, (*Arisaema triphyllum*). It is a lump of caustic, say those who have tried it. I once saw it played on a leading man in one of our college classes. He knew almost everything but his class-mates, by making him bite Jack, gave him a new and active sensation.

Veratrum viride or white hellebore is usually spoken of as our most deadly poison. It is often known as sneeze-weed and can be recognized in early spring by its very handsome, ample, plaited and intensely green leaves. The plant grows in low grounds with skunk-cabbage, another acrid plant. The roots are the toxic parts of hellebore. The plant has a place in the pharmacopeia, but is better known as a vermifuge.

Brown Univ., Providence, R. I.

SUGAR.

CANE sugar, sucrose or simply sugar, as it is known to commerce and in the household exists dissolved in many vegetable juices. It is found in the stems and roots of all grasses especially in the sugar cane and sorghum; in fleshy roots as the beet, carrot, turnip and sweet potato; in the sap

of trees as the date palm and sugar maple; in almost all sweet fruits and in the nectar of flowers; but only in a few of these is the proportion of cane sugar large enough to make profitable its separation from the other substances which these juices hold in solution.

The manufacture of sugar as at present known is an art that has developed from crude beginnings. Sugar is a staple article of food, just as is bread or meat, but few people realize that unlike meat and bread it has been a staple food for but a few generations. Only indeed in the last half century has it been produced in such quantities and at such a price as to bring it within the reach of all classes of people.

Sugar from the sugar cane was probably known in China 2,000 years before it was used in Europe. When merchants began to trade in the Indies it was brought westward with spices and perfumes and other rare and costly merchandise and it was used for a long time exclusively in the preparation of medicines. An old saying to express the loss of something every essential was "Like an apothecary without sugar." Greek physicians several centuries before the Christian era speak of sugar under the name of "Indian salt." It was called "honey made from reeds" and said to be "like gum, white and brittle." Not until the middle ages did Europeans have any clear idea of its origin. It was confounded with manna or was thought to exude from the stem of a plant where it dried into a kind of gum.

The sugar consumed in this and other countries up to 1850 was nearly all derived from the sugar cane, but at the present time two-thirds of the sugar crop is from the sugar beet. It would once have seemed incredible that the kitchen garden should furnish a rival for the "noble plant" that had made the fortunes of Spanish and English colonists, but the cultivation of the beet has in one generation shifted the center of the sugar industry from the tropic to the temperate

zone. Marggraf a chemist of Berlin first discovered in 1747 that beets with other fleshy roots contained crystallizable sugar identical with that of the sugar cane. From the 5 per cent as found by Marggraf the sugar beet of good quality now contains 15 per cent and more, 12 per cent being considered necessary for profitable manufacture.

The sugar maple of North America is also a source of sucrose, the tree being tapped in the early spring to obtain the sap as it flows upward. The sap was formerly simply boiled down in open kettles and used as molasses, or the evaporation was continued until the sugar crystallized and the brown maple sugar was obtained. Five gallons of sap yielded about one pound of sugar. In 1894 the amount of maple sugar produced, including that upon which no bounty was paid was over 7,500,000 pounds.—*From Farmers' Bulletin No. 93, U. S. Dept. Agriculture.*

NOTE AND COMMENT

THE PIG LILY.—Africa is the home of the calla lily, but it is not held in as much esteem at home as in our part of the world. A missionary from South Africa recently told the editor of this magazine that in that country it is called pig lily, because pigs are fond of the bulbs.

TOXIC POLLEN.—There seems to be little question but what hay fever is caused by the pollen of various plants. The common ragweed (*Ambrosia artemisiaefolia*) is regarded, probably with justice, as the chief offender, but according to *Scientific American* one hundred and fourteen plants are known to have toxic pollen. Normally these affect the sufferer only when the flowers that produce them are in bloom,

but it is quite possible to produce the symptoms of hay fever in the winter by snuffing up one of the toxic pollens.

PRODUCTION OF COCOA.—Fifty years ago, the inhabitants of the United States seem to have known very little about cocoa and chocolate. The consumption of this food averaged about three-fifths of an ounce for each person. Since then the use of cocoa in the United States has become twenty times as great. In 1903 it is estimated that we used more than two hundred and eighty million pounds.

THE SUNFLOWER AND THE SUN.—A writer in a current natural history magazine scouts the idea that the common sunflower constantly keeps its head of flowers turned toward the sun. It is quite likely that a plant whose flower heads are as large as those of the garden sunflower would find it difficult to turn them daily through half of a circle, but the smaller and lighter species of sunflowers seem to do so.

ORIENTATION OF SOLOMON'S-SEAL.—One can hardly fail to notice in a patch of Solomon's-seal (*Polygonatum giganteum*) that practically all the fruiting stalks bend in the same direction. Further observation will be necessary to determine whether the direction in which the stalks bend is due to light, wind, or warmth. Observations on this point will be welcome. In sunny swamps the fronds of the common chain fern (*Woodwardia Virginica*) usually face the sun, and many a colony of sunloving plants on the borders of woodlands face away from the shadows, but the Solomon's-seal is ordinarily a shade plant and possibly some other explanation of its turning must be found.

AN UNFORTUNATE SUNFLOWER.—There is an old story of a country boy who caught an owl and finding that the bird could apparently turn his head completely around, was able to wring its neck by the simple expedient of attracting its attention and then walking around its perch several times. A

parallel to this comes from the Arctic circle where it is said a seed of the common sunflower was planted. All went well until the flower blossomed. At that season, due to the latitude, the sun does not set at all but circles around the horizon for the entire twenty-four hours of each day. The sunflower, true to her instincts continued to face the sun and soon twisted her head off.

VARYING ODOR OF THE FIR.—Five years ago I spent the summer in the mountains botanizing. At the time I noticed that the firs (*Abies concolor* var *Lowiana*) at times gave out a peculiar strong odor. This summer I have been camping among the firs, and noticed that when there were indications of rain in the atmosphere the trees throw off this odor more than at any other time. I studied them closely for seven weeks. I noticed at times I could not detect it at all, while again the air was filled with it. I could not smell it as strong if I was close to the tree as when I was 15 or 20 feet from it, and it differed from the odor the trees have all the time. I would like to know if others have noticed this peculiarity and can explain it. [It is a peculiarity of the human constitution that most odors are more perceptible when the air is moist. Roses which in the damp air of the greenhouse have considerable fragrance, appear to have much less when transferred to the drier air of the living room. A great many night-blooming plants are fragrant, but this fragrance is more noticeable to us and possibly to insects by reason of the damp air of evening.—*Ed.*]

DISSEMINATION OF OSAGE ORANGE.—With most fruits and many seeds, it needs but a glance to discover the means by which they are dispersed. The wing on the maple fruit, the ash key, the bract on the basswood peduncle, the pappus on the thistle achene, the silky awn on the clematis, can mean nothing but wind distribution. In the same way the burdock and beggar ticks show that they were intended to be distributed by catching into the fleece of animals while the

berries and drupes indicate that birds and small mammals are the chief agents in their dispersed. What agency the Osage orange had in view when its great orange-like fruit was evolved is something of a mystery. Its sticky latex and disagreeable taste apparently repel all grazing animals, while its weight is so great that it can be moved by such animals only. Owing to its shape it might roll for some distance when dropped from the tree, or it might float away on the water. Our readers are invited to offer other explanations.

THE OSIER OR BASKET WILLOW.—The basket willow is properly catalogued among American farm products rather than among the products of the forests for these willows are grown like other farm crops. According to the *Tribune Farmer* the largest willow farm in the United States is at Clyde, N. Y., near the city of Rochester. It is fifty-five acres in extent. Low moist land is best for such farms and once set, the willow plants last indefinitely. The willows are cut to the ground in the fall and the next spring a new crop of straight slender branches grow up. From three to eight tons of cuttings are produced to the acre, the price at present being about \$18.00 a ton. Most of these willows are used in basket-making and for similar work, but in the grape-growing regions large amounts are used for tying grapes. Small willow farms are familiar sights in the grape regions of New York State. A field of willows in full growth looks from a distance like a field of hemp.

DELAYED GERMINATION.—Most seeds germinate shortly after they are planted. Usually, in our climate, they remain dormant during the winter following their dissemination, though not a few begin to grow in autumn and pass through the winter as seedlings. Thus has arisen a group of plants known as winter annuals. These spring up in autumn, flower the next spring, and die before the summer is well under way. The true biennial devotes the first year of its life to storing up

plant food and the second year to flowering, but by planting the seeds of such plants in autumn, we may induce them to produce seeds before the next autumn or within a year. Contrasted with the behavior of these seeds is that of a few others, which not only do not germinate the year following the one in which they were produced, but remain dormant for many years—possibly twenty years or more. The cause for this delay in germination is not very plain and Mr. William Crocker of the University of Chicago has been investigating the subject. In the *Botanical Gazette* for October, some of his conclusions are published. In general he finds that a delay in germination is due to the seed coats which so completely shut out moisture that the embryo cannot get enough of it for growth. This is true of the Indian mallow (*Abutilon avicinnae*), only a small per cent of whose seeds will grow after weeks of soaking. If the seed coats are broken, however, practically every seed will grow in a very short time. Essentially the same conditions govern the germination of our common plantains (*Plantago major* and *P. Rugelii*) the shepherd's purse (*Capsella bursa-pastoris*) the pigweed (*Chenopodium album*) and the cypress spurge (*Euphorbia cyparissias*). A few other seeds will absorb water readily, but the seed coats are so impermeable to oxygen, another essential, that until the seed coats are injured the embryo cannot grow. In the fruit of the clot-bur (*Xanthium Canadense*) there are two seeds of different shapes, one above the other. The lower one of the two usually grows the first year, but the upper seed, remains dormant for long periods of time, waiting for the necessary oxygen. *Axyris Amaranthoides* is another plant which produces two seeds of different shapes, but these are on different parts of the plant, instead of in the same bur. Owing to a difference in the thickness of the seed coats, one shape of seed will germinate at once, while the other remains dormant for years. Among our common hawthorns (*Crataegus*) the delay in germination appears to be due to some peculiarity of the embryo, which is not understood at present. It is a question whether the delayed germination of seeds has been evolved by plants to give the seeds a distribution in time, or whether it is an inherited tendency of no special value to the species.

EDITORIAL

Such is the confusion existing in botanical nomenclature that no matter what rules are adopted for naming plants, some pretext will be seized upon for getting in a few new names. The recent International Botanical Congress which met in Vienna, adopted a set of rules that are apparently far in advance of any others looking toward a stable nomenclature, but even these, it seems, will make way for numerous changes. In the early days of botany, even the leaders had a very shadowy conception of species, a still more hazy notion as to generic relationships and an absolute lack of honesty in the application of plant names. If the names given to a plant by its discoverers did not happen to please the tastes of the next one who wrote of it, he did not hesitate to give it a new name. Often a dozen or more different names were given the same plant unintentionally by workers in different parts of the world who had not the facilities that we have for ascertaining what is going on in the science. But whether intentional or unintentional the multiplicity of names has made a fine chaos out of which each modern botanist thinks he can erect an ideal nomenclatural cosmos if only the rest would adopt his rules. Thus it happens, that innovations are constantly proposed. Although all the world may be unanimous in the use of certain plant names there are plenty of botanists who would adopt new and strange names in place of them simply because the strange ones were given first. That the latter failed to get into use seems to them of no significance.

* * *

For our own part, we are inclined to look upon the name of a plant as simply a convenient means of handling it mentally, and to insist first of all that it be stable and unchanging. What earthly difference does it make *what* a plant is called, so long as the name is one that everyone recognizes? And yet these

dealers in nomenclature ask us to change these names because some long-ago dead-and-gone botanist failed to receive credit for the names he made. Alas, for the sincerity of the nomenclaturists' professions, it is noticed that a change is seldom made unless somewhere in the shake-up his own name is attached to the new specific combination. Simmered right down to fundamentals we are asked to change a lot of names that a few botanists may be embalmed in print in the author-citation of species. Some of the most active workers in the field of nomenclature have contributed practically nothing to the science of botany.

* * *

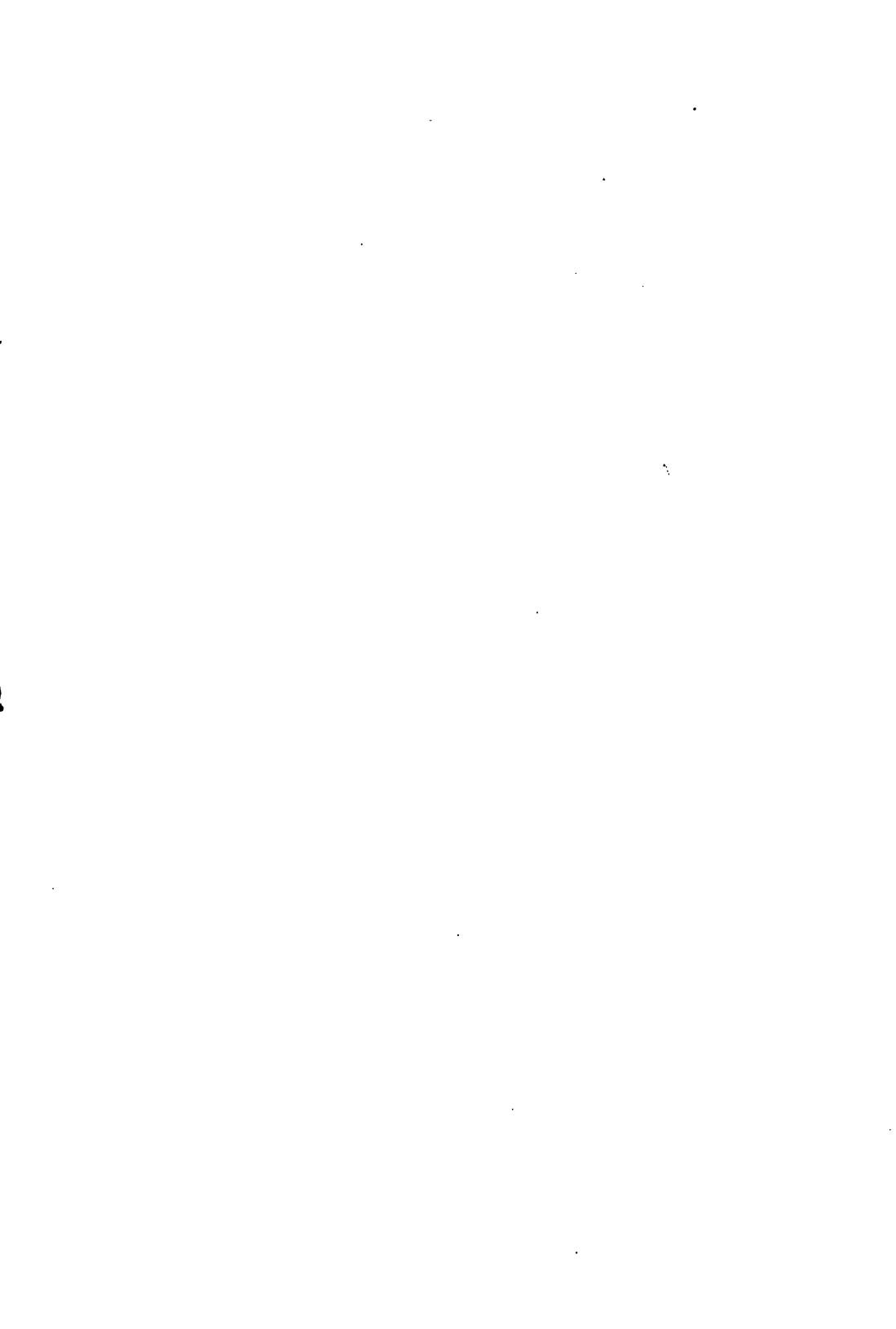
The common names spice-wood and sassafras, are known to nine-tenths of the people who have attained their majority in the region where these two plants grow, but we are absolutely certain that not nine-tenths, nor even one-tenth of the plant students know the scientific names of these same species. No longer are they entitled to those abominable "duplicate monomials" *Benzoin Benzoin* and *Sassafras Sassafras* nor yet to the more familiar appellations of Gray's Manual *Lindera Benzoin* and *Sassafras officinale*. Dr. B. L. Robinson in *Rhodora* for October has dug up a new name for each and according to the Vienna rules we should now write *Benzoin Aestivale* and *Sassafras Variifolium*. We say "should write" advisedly for whether this magazine will do so depends upon the amount of evidence forthcoming that these names are not to be changed again. The new name for the spice-wood is just as expressive as the old one and that for the sassafras is much more appropriate than any the plant has borne recently, but if these Vienna rules, under which the plants were renamed, will permit of another change in a few years, then we are going to wait for the last change even if we die before it comes, as in all likelihood we shall.

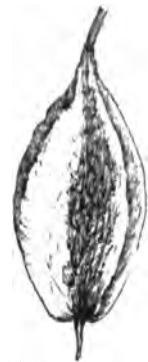
There is just one way to get a nomenclature for American plants that will not change and that is to adopt a set of names by agreement. Let the Harvard University men issue that new edition of Gray's Manual that we all know is being incubated and let them issue it in conformity with the Vienna Code. And then let us call a halt to name changing. Let us adopt the names there used and let us stick to them no matter how many musty names are subsequently exhumed at New York and Washington. All we ask is for a collection of vowels and consonants that will forever represent a certain species. To adopt the course outlined above would deprive a lot of "botanists" of an occupation, but it would advance real botany immensely and that is what we are after. And now, shall it be *Sassafras Variifolium* or shall it be *Sassafras Sassafras officinale*?

BOOKS AND WRITERS.

The publishers of Parsons' "Wildflowers of California" inform us that the stock and plates of this work were all destroyed in the fire that followed the San Francisco earthquake. It is to be hoped that another edition may be brought out.

In order to meet a more popular demand, the publishers of Mrs. Elisabeth Hallowell Saundier's publication of color prints of "California Wild Flowers", recently noticed in these columns, have issued a special edition this autumn, consisting of two sets of six flowers each, instead of the one set of a dozen flowers as originally. The sets of six retail at 50 cents, and may be had by mail from Sanborn, Vail & Co., Los Angeles, California.





Halesia

Buttonwood



Cat-tail.



Bignonia



Catalpa



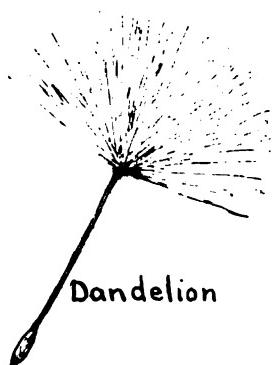
Oleander



Actinomeris



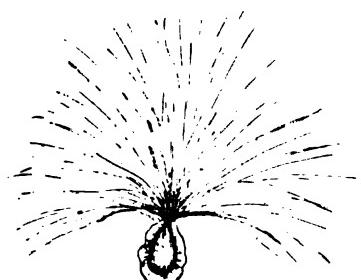
Clematis.



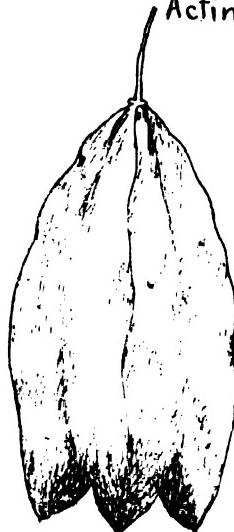
Dandelion



Anemone



Milkweed



Bladder-nut

WIND-DISTRIBUTED SEEDS.

THE AMERICAN BOTANIST

VOL. XI.

JOLIET, ILL., DECEMBER, 1906.

No. 4

WIND-DISTRIBUTED SEEDS.

BY WILLARD N. CLUTE.

ALMOST as soon as there were seeds, various agencies and conditions began differentiating them and perfecting their devices for transportation. Undoubtedly the wind was first impressed into the service of carrying seeds, if, indeed, it did not originate the whole custom. The first seeds were, in all probability, without means of any kind to aid them in seeking new territory, but even the slight chance of being moved some distance that the first faint wing-like expansion of a seed gave to it must have resulted in favor of such seeds in the long run. Thus was originated a series of modifications that have extended to our own time—modifications that Nature is as keen about now as ever and which she takes as much pains now to keep up to their highest efficiency as when she first began.

It is a far cry from the first small seeds blown about by the wind to the present day seeds with their wonderful modifications for sailing. Many seeds seem never to have got beyond the first stages of the process and to this day rely upon their small size and light weight to secure transportation.

Very early, however, two main lines of evolution for wind-borne seeds seem to have been selected. On the one hand, this evolution has led to the great group of winged seeds in which the wing not only acts as a sail, but in various ways retards the fall of the rather heavy seed to the earth; on the other, we have a group as large or larger in which the seeds are so light that the most fragile of silky parachutes is capable of carrying them long distances.

It is interesting to note the differences in the way Nature looks after these two groups of seeds until they are mature.

The true winged seeds are known to be such at the start; they are hung up where all may see. Not so, however, with the parachute seeds. While they are ripening there are few evidences of the fact about. The uninitiated could never single out from among the ripening seed-pods the caskets containing these treasures, until suddenly some fine day the pods open and the secret is out. The silky hairs, compactly folded into the smallest compass while growing, are now gaily spread and with the first breeze the seed is launched.

Not all winged seeds, we hasten to say, are locked up in seed-pods until mature, but a great many of them are. As with the winged seeds, Nature has various ways of arriving at the same end. Now she modifies a seed-coat into a parachute and again it may be the whole fruit that is thus modified, or possibly the calyx or the style. Then too, there are seeds that appear undecided whether to be winged seeds or parachute seeds. Such a one is the catalpa, which all winter long lies snugly hidden in the long cylindrical pods hanging on the tree. When, in early spring, the pods split into two long valves and the seeds come tumbling out we see that they are winged for a short distance and then fringed with silky hairs. The trumpet creeper (*Bignonia*), one of the catalpa's nearest of kin scarcely belongs with the parachute-seeds though it, like them, depends upon its lightness to ensure its transportation.

Sometimes it becomes a nice matter to distinguish a fruit from a seed, and to discover just what part has been modified into the parachute. As thistle-down and milkweed silk float by, we can scarcely believe that one is an entire fruit and the other but a seed. Yet so, it is. The so-called seed of the thistle is really a fruit, and the silky parachute or pappus that carries it is made from what would be the calyx in another flower. The milkweed fruit, on the contrary, is the milkweed pod, and its seeds are carried by a parachute made from the coat of the seed itself. The dandelion belongs to the thistle

class of travellers, but the oleander like the milkweed, has a pappus made from a seed-coat.

The curious spheres of the button-wood (*Platanus*), so familiar to the rambler in winter, enclose great numbers of club-shaped nutlets, each one of which is really a fruit. Their sails are modified from the walls of the ovary. Another plant with fruits packed in a close head is the cat-tail. One has to break into one of these close-packed heads late in the year to fully realize the immense number of seeds it contains. They are all stood on end, as it were, with the tips of the seeds pointing outward. Below the seed, toward the interior of the head, there is a stalk-like structure set with the silky hairs that form the parachute. By many, these hairs are held to represent calyx and corolla. In any event what we have been inclined to call a seed of the cat-tail is really a fruit.

One of the most interesting of the devices for being carried by the wind, because of its unusual origin, is found in the common wild clematis. Here it is the style that has become feathered for transportation. The whole buttercup family, to which the clematis belongs is noted for including its style in the fruit, and in the anemone, this is to be seen though the short woolly hairs that clothe its fruits are out-growths of the ovary.

As a general thing wind transported seeds are adapted to sailing in some way through the air. Some, however, like the bladder-nut seem intended to be rolled over and over on the ground. There are those who believe that the three water-tight compartments of the bladder-nut point to its adaptation for floating on the water, but the unusual lightness of its inflated pod seems to place it with the seeds distributed by wind. The fruit of the silver-bell tree (*Halesia*) seems to be another of like character. As for the fruits of the parsley family and many of the composites like *Actinomeris*, these are really winged seeds that bridge at another point the gap that separates winged seeds and parachute seeds.

"PERUSIN" THE "PENNYRILE" COUNTRY.

BY SADIE F. PRICE.

IN the autobiography of the art critic, Hamerton, he mentions that he once had a scheme for travelling in Egypt and laid it before Mr. Ruskin, who said, "that he avoided travelling in countries where he could not be sure of ordinary comforts, such as a white table-cloth and a clean knife and fork; "still," he added, "I would put up with a great deal of inconvenience to be near a mountain." It is this love of Nature that one must have to endure the discomforts of an excursion through the "ridge country" of southern Kentucky. The State is divided into four parts, known in local parlance, as the blue-grass and the bear-grass countries, the "penny-rile" and the Purchase. Though the people of the blue grass" may speak disdainfully of the rugged hills and knobs of southern Kentucky,—the "penny-rile",—yet it has a charm and interest for the botanist and the lover of Nature that more cultivated farm-lands and level stretches of even the beautiful blue-grass, cannot give.

With "a comrade neither glum nor merry" I made a botanical collecting tour through this country some years ago, seeing much of its caves and cliffs, and its quaint people,—a type by the way, quite as interesting as their much-written-about brothers of the east Kentucky and Tennessee mountains. Our way before reaching Green River led over a long stretch of turnpike, then a rock incline until we reached the sandstone ridge. We crossed many little streams,—one of them dark, with asphalt in the soil. A country church bearing the inscription:

NEW
BETHEL BAPTIST
CHAD. 1880

which, no doubt, translated, would read *Baptist Church, Anno Domini, 1880*, stood in an avenue of tall old sycamores, whose

silver trunks were festooned with the flame-colored blossoms of the trumpet creeper,—the floral emblem of Kentucky.

After leaving the main route we entered a rough country road that passed beneath the edge of a large rock projecting far over a cave entrance. As we approached, the cave opened dark and weird before us, and the road was in deep shadow under the immense chestnut oaks and beeches that bordered it. A number of wagon wheels leaned against the wall of rock. These suggested that they were possibly the remains of accidents that had occurred on this rough, rocky road; but we found on coming nearer,—and one really does not expect to find cliff-dwellers in Kentucky,—that there was a blacksmith's shop under the projecting rock, and that a family made their home in the cave!

When we reached our first stopping place, and made arrangements for board, including the services of a "small boy" to act as our guide over the hills, we saw the eyes of our African driver grow big with wonder and surprise; for there is nothing the town "darkey" has more contempt for than the country "white trash" as he dubs them. As he glanced at the head of the family, his many shoe-less children, and the log cabin in the back-ground, he exclaimed: "Y'all ain't goin' to stay heah by yourself is you?"

A feeling of sadness came over us as we watched our driver turn the horses homeward and we were left in the wilderness, may miles from a railway. Checking, however, any thoughts of the flesh pots we immediately started on a collecting tramp—a sure cure for any of the worries of life—and were soon absorbed in its pleasures. We were prepared to rough it, so were not surprised that our room was of unplanned and unsealed boards. A weed grew up through the floor, a foot or more above the boards. There was no fastening on the door; a chair with the water-bucket on it answered as a bolt at night. The bed, with only one sheet, was our one

piece of furniture. We could boast of only a half ownership of the two chairs, since they were ours until meal-time, when we were expected to carry them out on the porch where we ate.

The fare was plain and coarse, the breakfast and supper at least; our noon-day meal in the woods each day, consisted of fruit and the remains of the lunch brought from the house. Though these meals at the house were anything but enticing, yet we put up with the discomforts of everything gladly, as we had the mountains with us. I shall not soon forget those early morning breakfasts at "sun-up" when we heard the birds at their matins, and watched the dew-drops that transformed the homely weeds about us into things of beauty; or on cloudy mornings watched the fog clouds rise above Green River. In the evening, too, we sat here after tea to see the sun set and the great chestnut trees on the hill grow black against the sky, only their pendant clusters of blossoms giving them a touch of light here and there, while the whip-poor-will's call came to us from the rock hillside near.

The picturesque little creek of this locality,—a mere brook in dry weather, with its banks covered with laurel,—is called Ivy Creek, the local name for the laurel (*Kalmia latifolia*) being "Ivy." Laurel is a rare plant in this part of the state and is only found along this Green River ridge, straying down from the mountains of east Kentucky, where it is common. Three species of huckleberries grew on the hills, while under the cliffs ferns grew in the greatest profusion.

"That bonnie road

That winds about the fernie brae,"

its borders "knee deep in ferns, half-hid in flowers" was a never-failing delight to us. The cinnamon fern, the spinulose and marginal shield ferns, the delicate lady fern, the more common maiden-hair and others that delight in deep shade and moisture grew here, while the face of the sandstone cliff was dotted over with masses of the delicate maiden-hair spleen-

wort. But the gem of all was a mass of the rare filmy fern (*Trichomanes radicans*). Far under the cliff, where the rocks were dripping with moisture and where the sunshine never reached the fronds, was the home of this delicate fern. My first view of this interesting plant was a memorable one. A turn in the cliff, a lowering of the head, still lower, down on the knees, then I obtained a full view of the dainty beauty. But to collect it a humbling of my pride was necessary, as I had to cast aside hat and botanical equipment, and crawl under the projecting rock, with scarcely room for head and shoulders to enter. It meant strained muscles and a fresh accumulation of mud on the dress that had already passed recognition, but it also meant a treasure to gloat over!

After packing to take leave for the next collecting field we found that the promised "spring wagon" that was to convey us away, was but a two-wheeled, home-made affair,—half road-cart, half sulky, with no room for baggage for two persons. So the plan of locomotion was rapidly changed and we were rowed up Green River in a "jow" boat. As the water was so clear, and such a bright green,—true to its name,—and the bluffs extremely beautiful, we did not regret the change. The next house we stopped at, a frame and not a log one, in a yard full of old-fashioned red and yellow roses, made us take heart as to accommodations, but a near glimpse of the family, and the rooms soon dispelled all hopes of finding more comfort. We spent two days on the banks of Ivy and Indian creeks, then went in a wagon some twenty-five miles farther north into another country.

The people there were all hospitable and treated us well, but were primitive and quaint in habits and in speech. The members of the dialect society would be pleased at the many obsolete words heard here, many that may be traced to old English and Scotch words. An old woman was "sorry she did not have time to *peruse* these hills" with us. A thicket

of either cane or other under-brush is called a "harricane," this originally meaning a place where a hurricane had once passed. "Ghoistes," "postes," "waistes," etc., are common words. The expressions "met up with," "I am a *heap* better," "Where's he at?" "much him up,"—(Make much of him) are also often used. "Thers infi-delity an thers fi-delity, an the infi-del's they don't belive in the Bible, an the *fi-dels*"—but I failed to catch the last of the sentence in this bit of conversation that I over-heard one day between two of these men. There is a sameness in names in that particular neighborhood, and the Jones' and Miller's are so numerous that to distinguish the Bens and Bills of the same family name it is necessary to give them some prefix, hence they are known as Devil Bill Miller and Rum Tom Jones, etc.

I had the courage to go to the home of the first named gentleman and found him, notwithstanding his name, a pleasant, bright-faced man. He, and his daughter, a beautiful, bare-footed girl, that Craddock might have used for a study, accompanied us to the cliff and the picturesque water-fall of seventy-five or more feet that they called the "Fall-over." When we had made the descent and stood under a high shelving rock, the man was impressed with the grandeur of the place, and exclaimed, excitedly, while pointing to the rock above and the immense masses lying below,—"Don't you s'pose all this happened when Christ was crucified?"

The old grandmother, who wore a red bandanna hand-kerchief over her head and sat smoking a pipe, asked me when I entered the house to "rest" my hat. The girls had bright and intelligent faces, but the woman, the mother of fourteen children, was dull and uninteresting. Among these people I found the men always brighter and more good-natured than the women; because they see more of life, and perhaps, too, because they lead an outdoor life and see much of nature. One of these men, a superintendent of a Sunday-School, said—with

any amount of self-esteem—that he studied plants, too. He gained his information, he said, from Dr. Gunn's book. These houses, with few exceptions, are rarely without this book, often the only one they have. It is considered infallible, and the plants are identified by the plates in the book,—with what degree of correctness one can imagine. To them a plant stands for a remedy for asthma, rheumatism, croup, etc. They were quite disgusted that the medicinal properties of plants formed no part of my studies, for if so, "I might be doing some good." In their gardens they cultivated thyme, lavender, saffron and many old English herbs.

(*To be concluded.*)

SOMETHING ABOUT NAMES.

BY DR. WM. WHITMAN BAILEY.

DO not tremble, gentle reader, this is not to be an article upon the vexed and vexing question of nomenclature. No, it is to string together some thoughts as to "what's in a name?" If a botanical one, a good deal, sometimes in letters—like *Mesembryanthemum*, in which there are sixteen; sometimes in meaning, which may be wholly erroneous or indefinite, as *Menyaanthes* and many others.

A misapplied vernacular name, like honey-suckle to azalea or columbine, gives one a distinct shiver. He has a milder tremor when he hears *Maianthemum Canadense* called Solomon's-seal. Surely it is forgery if not *lese majeste*, to misuse the sign manual of the wise old King—of him who could confine a genie in a beer bottle! Now, there is a significance really pretty in that name when applied to either species of *Polygonatum*. Their rhizomes, by the falling off of a shoot, are marked by a succession of stamp-like scars, as of the impression of a seal on wax. The smilacinas and maianths do not show these, or if so, in less degree.

Pretty names of the vernacular are spring-beauty, grass-of-Parnassus, pyxie, lily-of-the-valley, Snow-on-the-mountains, penny-wort, golden-rod, pimpernel, daisy (the day's eye of Chaucer), primrose (the prime-rose, of early English), "Jack-in-the-pulpit, gold-thread, etc.

On the other hand are a lot of meaningless names in place of which the botanist has more euphonius ones—often, too, more designative. Thus, minny-berry for the sugar-berry, or *Celtis*, buck-bean for *Menyanthes*, "Water-violet for *Hottonia inflata*, a plant of the primrose family; false-indigo, for *Amorpha*.

Old garden names derived from our English home, are many of them deep-bedded in our literature, as betony, agrimony, rue, lords-and-ladies, thistle, ladies-smock, mourning-bride, cowslip, money-wort, honesty, and the like.

I wonder if our readers, by the way, know the fun, as dear old Dr. Gray used to say, he had "tucked into his manuals"? He once pointed out to some of us in the Summer School at Harvard, in those elysian days never to be forgotten, the reading under *Lunaria*. The unsuspecting does not, as modern slang graphically puts it, at first "catch on."

"*Lunaria annua*, common honesty. Not native to the country, but still to be found in old-fashioned places.

Lunaria redeviva, perennial honesty. This is even a rarer sort.

We recall too, in sunny recollections of our old teacher, his comment on the name of *Ailanthus glandulosus*, "called by the Arabs 'the tree of Heaven', but the staminate blossoms redolent of any other odors than those of Paradise." He used to say with a twinkle in that marvellous eye of his, that "a humorous was not inconsistent with a scientific treatment of a subject."

The plants of the table have good, homely, expressive English names, as "carrot," "spinach," "turnip," "caraway,"

"dill," "beans," "millet," "corn;" while the aromatic labiates are a very nose-gay of sweets. Their titles are really musical, and we love them as the bees do the flowers. Read some of them, as thyme, marjoram, basil, balm, dittany, penny-royal, blue-curls, catnip, lavender, sage, and germander.

The whole of this random talkofmine—a sort of thinking aloud, comes from meditating upon the very un-meaning English name of our American plant, *Castilleia coccinea*, formerly called *Bartsia*. It is, as every one knows, usually called scarlet painted cup—in which the adjective alone is a fact. There is no cup or suggestion of one about the flower. The long, narrow, labiate flowers, indeed, are not considered. It is the showy, rather wedge-shaped, flat bracts that attract attention. How much better the Western name for another species, even more brilliant than ones, which travellers to Colorado and Wyoming will recall—"the Indian's-paint-brush." That it looks like, with its bracts, more or less laccinate and daubed with georgeous vermillion. I have thought, too, that the name given here at the East to the comparative new immigrant *Hicracing aurantiacum*, of Diana's paint-brush is significant and worthy.

Brown University, Providence, R. I.

BOTANY FOR BEGINNERS.—XXVI.

ORDER 10.—ORCHIDALES.

THE Orchidales represent the very highest forms of Monocotyledonous plants. In them the zgomorphic type of flower occasional in the Liliales and usual in the Scitaminales becomes the fixed and almost universal pattern. The epigynous form of flower, too, becomes the unvarying one, while in the Liliales it is only noticeable in a few sections like the irises and amaryllids. In the Scitaminales, which stand between the Liliales and Orchidales, we often find only one or two stamens functional, but the other stamens, though

卷之三

niaceae show the lily-like character of six stamens. Unlike the orchids the seeds of this family often contain endosperm.

It is the orchid family we usually think of when the Orchidales are mentioned; and well we may, for in point of variety form and color the flowers yield to no others. Some are noted for their bizarre forms and often resemble bees and other insects, others exhibit such beauty of color as to make them the most sought after of flowers, still others exhale delightful perfumes, but few are economically valuable to man with the single exception of the vanilla plant from whose pods the well-known flavor is obtained.

The great majority of orchids are inhabitants of the tropical forests where in common with other herbaceous plants they adopt an epiphytic life and thrive on the trunks and branches of trees. As the species extend toward the poles, they gradually descend to the earth. All the orchids of temperate regions are terrestrial, and practically all of them have the geophilous habit, that is, like the lily-worts, the life of the plant retreats to some underground rootstock, corm or tuber at the approach of cold weather. No less than three different kinds of roots have been distinguished in orchids. First there are the true earth roots, again there are roots for food storage and lastly there are aerial roots. Of these latter three varieties have been pointed out, namely roots for climbing, roots for absorbing nourishment from the decaying vegetation on the tree-trunks and the true aerial roots with a thick outer cortex designed to absorb rain, dew and the moisture of the air. All the orchids are herbs, seldom more than a few feet high, but in one tropical genus (*Sobralia*) they are erect and reach a height of nearly twenty feet. Many climbing forms occur, the vanilla being of this type.

Most of the orchids store food in some way. The terrestrial species usually store it in underground parts, but tropical species form curious green storage organs, called

pseudo-bulbs, which in reality are thickened aerial stems. These may occasionally reach the size of a large cocoanut. Some of the terrestrial species, like their allies of the Burmanniaceae are saprophytes, and still others are underground parasites, stealing part of their food, at least, from the roots of other plants. A few species have set up partnerships with fungi and some are so dependent upon their partners that their seeds seldom germinate without them.

The leaves of orchids are parallel-veined and often linear, though many broad-leaved forms occur. In the epiphytic species which are often exposed to drying, the surfaces of the leaf are often very heavy and nearly impervious to water.

Orchid flowers are too well known to need description. Suffice it to say that there are three greenish sepals, three colored petals, one of which usually differs in shape from the others and forms the so-called lip. There are never more than three stamens, seldom more than two and usually only one. The ovary is three-parted, but only two stigmas are usually functional. In many genera the stamens are united with the pistils to form what is called the column. The pollen often coheres in a sticky mass, which is transferred to other flowers by insect visitors, but some pollen is mealy and not a few orchids are able to set seed without the aid of insects.

Judged from every point of view, the orchids are a highly specialized race of plants and clearly entitled to the place they hold as leaders of the Monocotyledons. The simplest flowers are without calyx and carolla and are wind-pollinated, in the orchids they have well developed calyx and corolla and are insect-pollinated; in the simplest flowers all the parts are separate and often numerous, in the orchids the parts are united and all reduced to regular circles of three each, except the stamens which have less. The simple flowers are always regular and the orchids again show their superiority by extremely irregular flowers. In the orchids and other high types the flowers are

epigynous, while in more primitive ones they are hypogynous. Wind-pollinated and other simple plants have to produce much pollen; in the orchids the pollen is often much reduced in amount. All these indications mark the orchids the most complex of the Monocotyledons.

EDIBLE PINE SEEDS.

BY CHARLES FRANCIS SAUNDERS.

SEVERAL species of pines in the far west have large seeds which are palatable and nutritious, and besides having long been an important part of the Indians' bill of fare, are prized by the whites of the region for their pleasant taste. One of these, abundant upon the western foot hills of the Sierra Nevada, is *Pinus Sabiniana*, which, because of the fondness of the Digger Indians for its seeds, is locally known as the Digger pine. The noble sugar pine (*P. Lambertiana*) of the Sierra forests also produces edible seeds, but they are difficult to procure on account of the extreme height of the trees, which often tower upwards of a hundred feet before the branches appear. If one waits for the frost to open the burs, one usually waits in vain, as the industrious squirrels get the seeds almost before they reach the ground. A favorite way is to shoot off the cones with a rifle, just before they open. This a good marksman can readily do, as the cones are from one to two feet long and hang at the tip of the branchlets.

The one-leaved pine (*P. monophylla*) is another Sierra nut pine, abundant on the eastern slope and affording a food supply to the desert tribes. Fremont, in one of his narratives, tells of passing an Indian hut quite snowed in save for one path connecting it with a neighboring nut-pine tree, which supplied the isolated family with wood and food till the snow should thaw.

The best known pine nut of the southwest is the seed of *Pinus edulis*, known as the pinon. It is highly prized by the Mexicans and the gathering of the little seeds is an important industry of the Indians of Arizona and New Mexico, who dispose of them to the traders by tens of thousands of pounds during each autumn.

Fort Defiance, Ariz.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

A LARGE HEAD OF SUNFLOWER.—According to the *Ashland Gazette*, the State of Maine holds the record for the largest head of the common sunflower. Last season there was raised in Millinocket, a flower-head of this species that measured fifty-six inches in circumference. The head just filled the top of a flour barrel.

GALIUM LEAVES THAT ARE NOT LEAVES.—Those of our readers who have examined the cleavers (*Galium*) and other plants of simular structure in the Madder family, have doubtless a pretty distinct impression that there are often four or six leaves at each node. This, however, is denied by Lord Avebury, in "British Flowering Plants." He asserts that in all cases there are but two leaves at a node, and that the other two or four organs that appear to be leaves are, in reality, stipules. The leaves may be distinguished by the fact that they have buds in their axils as normal leaves do. When but

two of the extra organs appear at the node, they are regarded as consisting of two stipules grown together, when four are present, they are held to represent the normal number of stipules.

WINGED SEEDS.—Trees with winged seeds seem to be among Nature's most successful creations. In the maple family alone, there are about a hundred species, and the ash family has nearly half as many and all of them have winged fruits.

VARIATION IN RUDBECKIA.—From H. C. Ridlon, Cuttingsville, Vt., we have received a specimen of the yellow daisy (*Rudbeckia hirta*) in which each of the ray flowers is marked by a blotch of brownish purple at base. The plant from which our specimen came had twelve flowers on it, all with the unusual markings. This form of flower has been reported several times before, but it is always interesting and never common. Without doubt it represents one of Nature's variations from the normal, which DeVries has called an "elementary species." With such a beginning it would be a comparatively easy matter to breed a race of plants, all of which should have brown spotted ray flowers, or, indeed, a race in which the entire ray would be brown.

NOVEL USE FOR MILKWEED SEED PODS.—One day while collecting plants I noticed a couple of caterpillars which I very much desired, and having nothing suitable in which I could put them in, I looked around for something from Nature and noticed a large number of the common milkweed (*Asclepias speciosa*) loaded down with seed pods. I broke one of these off leaving the stem attached to the pod, split it open, took out the silky mass and the follicle then closed up quite tightly making a fine receptacle in which to put my young butterflies. As far as I have had occasion to use these natural repositories I always found them satisfactory.—*Earl Lynd Johnston, Evans, Colo.*

SEED DISPERSAL OF WATER PLANTS.—Lord Avebury in his "British Flowering Plants" observes that water plants do not develop wings or parachutes. While it is true that water plants are by the nature of their surroundings usually dependent upon the water for distributing their seeds, we must not forget that cat-tails, cotton-grass and willows at least, do have seeds modified for wind distribution. No doubt the list could be greatly lengthened by a careful survey of other water plants.

ODOR OF THE FIR.—Commenting further upon the phenomena connected with the odor of the fir mentioned in November BOTANIST, by Mrs. Buszek, whose name was intentionally omitted from the note, it may be remarked that the same peculiarity has been noted in Europe in connection with the lime (*Tilia*) and the grape. Lord Avebury writes "A remarkable point about the scent of the lime is that it is said to be strongest about thirty yards from the tree, as if the strength was brought out by some action of the air as it gradually diffuses." No doubt the firs mentioned by Mrs. Buszek must be placed in the same category.

CRIMSON-EYED SWAMP MALLOW.—The form of the swamp rose mallow (*Hibiscus moscheutos*), with a crimson center, was described some time ago as a separate species under the name of *Hibiscus oculiroseus*. Some doubt has always existed as to whether the two were separate species. That the two plants are different, no one denies, but that these differences are specific, may well be doubted. The plant is common along the Atlantic seaboard and was known to all the older botanists. If we decline to believe that there are two species, we find ourselves in very distinguished company. Seeds from both forms have been planted at the New York Botanical Garden, and at flowering time each has produced its own type of flower. This, however, would be only what one would expect. The various types of lettuce, radishes and

cabbage come true from seeds. The significant fact in these growing tests was, that among the progeny of the plant with rose-colored flowers were several seedlings with rose-colored petals, deep crimson bases and seed-pods intermediate between the two forms. The growers consider these forms as natural hybrids, but we suggest that they may be the same sort of "elementary species" that the evening primrose has been found to produce. Breeding from these so-called hybrids, one could easily produce the *oculiroseus* form. Any plant breeder would agree to do it, petals, capsules and all. In view of these facts, how can anybody call the two forms separate species? If the crimson-eyed form merits a distinguishing name, it should be *Hibiscus moscheutos oculiroseus*.

UNDISCOVERED ATTRACTIONS OF FLOWERS.—It is not always the flowers with the greatest expanse of petal, nor yet those with the sweetest scent, that attract the greatest number of bees and other insects. Often plants with the most insignificant of flowers, and apparently no odor at all are found to be swarming with insect visitors. The common European bryony (*Bryonia dioica*), one of the gourd family, is a plant of this kind. Some have suggested that the attraction consists of an odor that we cannot perceive, but which is noticeable enough to the bees, while others have been inclined to the opinion that the flowers emit ultra-violet rays, which, as Lubbock has shown, are perceived by both bees and ants. A German, Knuth by name, was first to make this suggestion and in support of it, he experimented with bryony flowers and found that they readily affected photographic plates.

MYCORHIZA AND THE HIGHER FUNGI.—It is well known to most plant students that certain plants, instead of producing root-hairs upon their rootlets with which to absorb plant food, have set up a partnership with various fungi in which the fungi act as root hairs and are nourished by the

plant in return for this service. Such root fungi are known as Mycorhiza and for a long time all Mycorhiza were supposed to be produced by a single species of fungus. At present, however, it is known that numerous fungi are concerned in the matter although the identity of but few have been established. According to C. H. Kauffman in the September *Botanical Gazette*, the mycelium of several of the higher fungi may form mycorhiza and those thus far identified, belong to the earth-stars (*Geaster*) pore fungi (*Boletus*) and mushrooms (*Tricholoma*, *Lactarius* and *Cortinarius*). The author adds another species (*Cortinarius rubipes*) to the list of known mycorhiza formers. The mycelium of this fungus is brick red in color, and may extend for nearly twenty feet through the soil. It grows in connection with maples and others. Doubtless the noticed fondness of certain fungi for certain kinds of woods may be explained in this way.

BOTANY AND METEROLOGY.—One would scarcely connect the study of Botany with that of Meterology; yet among rural peoples and others accustomed to having "signs" for everything we find that they connect certain developments of plants, with that of weather conditions, or in other words, the growth in certain directions of some species of plants foretell the nature of the coming meterological conditions. For example; It is said that the Welsh coal miners of Pennsylvania believe that the nature of the approaching winter may be told by observing the wayside flowers, if they be tall it indicates a long winter with deep snows, if they be low, little or no snow will fall. They reason, that as the seeds of these weeds are the main source of the winter's supply of food for snow-birds and others which linger in the North through our winter, if there are going to be deep snows these weeds will be tall, adapted by the wisdom of an overruling Providence to the needs of these feathered creatures and if little or no snow, the weeds will accordingly be low. Others of the so called in-

fallible signs of these simpleminded people and others who claim to have made a study of the matter are: the thickness of one season's growth of bark on the hickory, oak and maple trees; the size and number of cones on the pine and hemlock; the abundance or scarcity of berries of certain species of plants; the thickness of corn husks and the outer shell of the hickory nut and many others. There are also many "signs" relating to weather conditions applying to Zoology. These people claim, and with some degree of assurance no doubt, that until the science of Meterology becomes more exact they have as good ground for predicting in a general way what is in store for us as our paid weather man. It might be interesting and perhaps of some value if some one would compile a list of these so-called "signs" as far as they relate to Botany. Could we not have, through the medium of the BOTANIST, different observed coincidents between plant life and immediate or remote weather conditions?—*Earl Lynd Johnston, Evans, Colo.*

RANGE OF MONARCH BUTTERFLY.—Not a few kinds of plants are so dependent upon insects for pollination, that their very existence may be said to be bound up with the success of a single insect. Should the latter thrive, the plants flourish and spread to new regions; should the insect fail, the plants decline and perish. As is well known the plant covering of our earth is constantly changing and it is no surprise to find that the struggle for existence is quite as fierce among the insects. The common monarch butterfly (*Anosia plexippus*) the large red-brown insect common in late summer, whose larva feed upon the milkweed (*Asclepias*) is a sort of an English sparrow among the insects and has spread over a large part of the earth. According to Kellogg's "American Insects" it has spread over all of North and South America, the Hawaiian Islands and Samoa, and has also gained a foothold in Western Europe. Who knows what plants it has made rare by crowding out the insects that pollinate them?

EDITORIAL

It is seldom that individuals with money to spare make such good use of it as have the Lloyd brothers of Cincinnati, Ohio. The firm of Lloyd Brothers is widely known to the pharmaceutical world since it is one of the largest of wholesale drug companies, but it is by means of the activities of the brothers John Uri Lloyd and Curtis Gates Lloyd outside of business hours that they are likely to be remembered longest. Both are interested in scientific matters and the first named is also well-known as a writer of entertaining fiction. Curtis Gates Lloyd is an authority on various groups of fungi. Together the brothers have erected in Cincinnati, a three-story fire-proof building for the housing of their immense collections of specimens and the exceedingly complete and valuable scientific library. The doors of this institution, which is known as the Lloyd Scientific Library are freely open to the public during every week day. Although the Lloyd's do not find it necessary to ask for either state or municipal aid in maintaining the institution; its merits are becoming so well known that valuable gifts are constantly being received. One of the most noteworthy of these was recently received upon the death of Surgeon-General James Patteson Walker, of England, who left a magnificent scientific library to the institution together with an endowment of \$30,000 for its maintenance. Part of this fund is to be devoted to securing the services of experts in making investigations in medicine and pharmacy. In the present day, when so many are engaged in a wild struggle to pile up immense fortunes, the example of the Lloyd brothers in devoting time and money to things that will tend toward the advancement of science is most refreshing.

* * *

To spend a million dollars so that every dollar shall be well spent is a difficult proposition, though no doubt some

of our readers would be willing to make a try at it. The task of selecting worthy objects upon which to bestow money is daily becoming more difficult for the business of giving a bunch of novels to every community that has not already more than is good for it has nearly come to an end for want of more communities to operate on. Some enterprising billionaire may yet go Carnagie one better by giving a library to every individual who can read and there might be collections of picture-books for those who cannot, but if one has money to give away to deserving objects, why would it not be an excellent thing to devote some of it to the advancement of botany? The prosperity of our entire nation is based upon agriculture, and intelligent agriculture is based upon the principles of botany. And yet how many schools there are in which good teachers are hampered in the presentation of the subject by inadequate equipments. Even with the best of equipment, it is difficult to give the pupil a correct idea of the vegetation of other regions. What advances could not be made by a school with sufficient endowment to enable pupils to visit another region for a week or two each year—pupils of temperate regions enabled to spend ten days of winter in the tropics; pupils in the tropics allowed to spend a week or more of early summer in the North; pupils in the arid regions sent to rainy districts and vice versa. It would not need the income from the price of a Carnagie library to provide yearly trips of this kind for all time. And what a monument that would be to the man who established it! Should any of our millionaire readers be inclined to try the scheme, the editor of this magazine knows of a school that would cheerfully offer itself to be experimented upon.

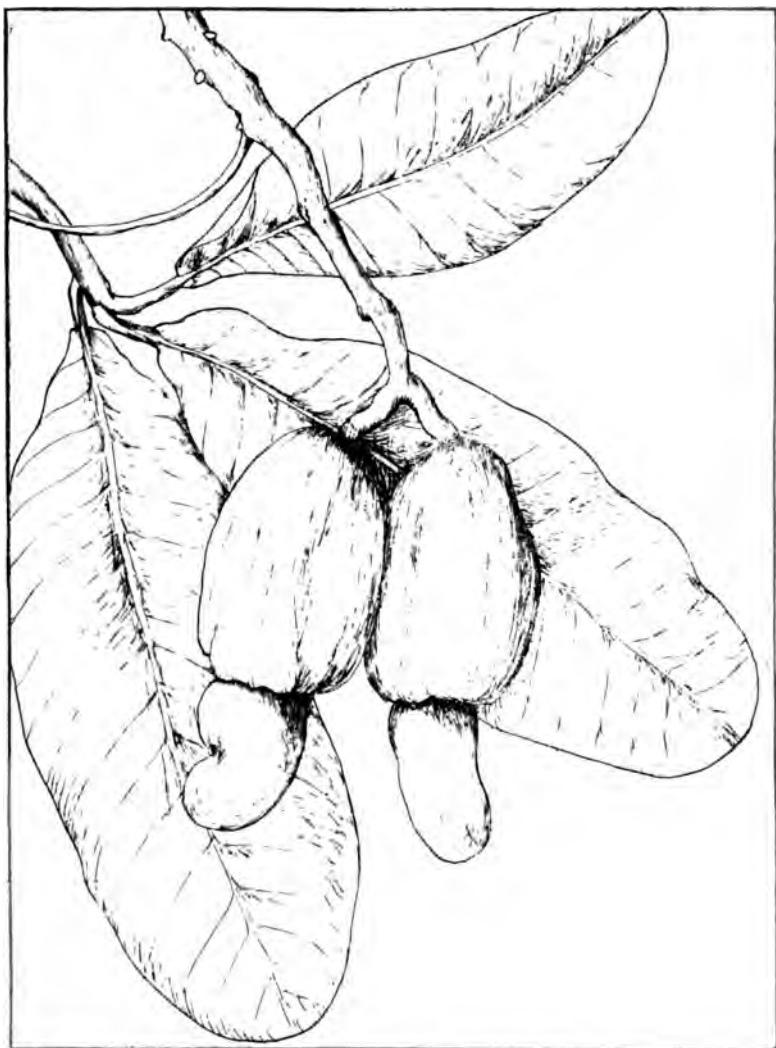
* * *

One rule adopted by the Vienna Congress that we are not fully willing to subscribe to, is the rule that after a certain date all new species described shall be described in Latin. At

first glance this rule might seem aimed at the weak points in the armor of American botanists for a large number of the most prominent are notoriously lacking in a knowledge of the dead languages. True some of them *have* described new species in Latin, but the less said of a great deal of such work the better the authors will feel, and the less Latin scholars will have to laugh over. It is possible in future that the latter will stop reading the intentionally humorous publications and subscribe for the botanical magazines. We cannot help wondering, however, if we had described a species in good English whether anybody would have the nerve to give it a new name on the strength of having placed our description in Latin. And yet, on the other hand, we must not forget that botany is not of one nation but of all nations. Japanese, East Indians and Russians as well as Germans, French, Italians and Scandinavians are working in botany and they may well insist that if we may describe species in our mother tongue they may in theirs. The selection of a dead language, therefore in which all species are to be described is, on the whole, good. The only objection being that it will tend to place the further advances of the science in the hands of the few and foster a state of affairs that will scarcely be advantageous. This is not the first time that botanists have schemed to have their own small set dominate and command the whole realm of plant studies and we doubt if in the end it will be any more successful.

A new Canadian publication in the line of the Natural sciences is the *Bulletin of the Picton Academy Scientific Association* under the editorship of H. F. Monro. The first number contains a list of 33 species of the myxomycetes of Picton County, N. S., with notes by C. L. Moore.





CASHEW—*Anacardium occidentale*.

THE AMERICAN BOTANIST

VOL. XI.

JOLIET, ILL., JANUARY, 1907.

No. 5

SOME FRUITS FROM A TROPICAL GARDEN.

BY WILLARD N. CLUTE.

HERE are many delicious fruits in the tropics, but one must not suppose that all are as palatable as the few that come to our markets, at least if a native of the temperate zone is to decide. They send us their best, no doubt, but Nature has treated us far too well in the matter of native fruits to make us exact and impartial judges. If we were to take the testimony of Jamaicans we should be warranted in ignoring that prince of exotics, the orange, so long as apples are to be obtained. With them an apple is a luxury. All are brought from "The States" as our part of the world is called. But it is no disparagement of our fruit, to place the orange before the apple in the list, though it may be doubted if any of our countrymen would permanently exchange our peaches, plums, cherries, pears and wild berries for all their strange and wonderful fruits. The thoughts of for ever afterward receiving them in tin cans, or tins, as the Jamaicans say, would rise up to spoil the bargain. However, the tasting of unfamiliar products is a novel, if not always pleasing experience, and one to be desired if one does not possess the caution of a tourist of the writer's acquaintance who said when urged to try some of the many fruits before him "No, thank you. I know bananas and oranges and I guess I will stick to them"—and he did. It is the purpose of this article to set forth some of the impressions of one who did not.

After one begins his conquest of tropical fruits, he soon perceives that many are lacking in the qualities that make ours so desirable. There seems to be something in the climate that takes the full rich flavor out of them, just as it takes the viril-

ity and energy out of the inhabitants. Many fruits barely escape being delicious through some apparent caprice of Nature's. Having got together all the materials for the most luscious of products, she spoils it all by withholding one ingredient or putting in too much of another. This charge, however, cannot be brought against her with regard to the Jamaican orange. It is the most juicy and luscious of fruits to be found anywhere. It is a question whether one eats or drinks it. Even those who are ordinarily not fond of oranges agree upon the qualities of this. The general excellence is perhaps due to the directness with which it leaves the tree for the table. No doubt it loses something in being transported a thousand miles or so. The orange is much used for the "tiffin" or early breakfast, which every normal Jamaican takes before rising. The real breakfast seldom comes before nine o'clock. A favorite way of preparing this fruit for eating is to pare off the outer oil-bearing skin with a sharp knife leaving the white inner portion. Then cut it in half across the "pegs" as the sections are called and eat it out of the hand. The natives have no use for a spoon in eating an orange; such methods are left for Yankee tourists. Most of this delicious fruit is said to come from wild trees which spring up anywhere. It is certainly cheap enough—three good specimens may be bought for one penny, American money.

Sweet oranges are usually picked when they are mature or "full" and the skin still green. One never sees trees of this variety loaded down with ripe fruit, but the Seville or bitter orange, being of little value except for the oil in the skin is allowed to ripen on the tree and falls to the earth unnoticed. Such trees are often as thickly hung with their bright orange fruit as any Northern apple tree is with apples, and makes as fair and attractive a picture as one would wish to look upon. In parts of the island, the natives make a drink, similar to lemonade from the pulp. The juice is mixed with

water and sweetened with the dark brown home-made sugar, when it forms a beverage that looks and tastes very much like new cider. With a pitcherful of this within reach, one is at a loss which most to admire, the climate which makes an abiding thirst possible, or the land that affords such pleasant means of satisfying it. Lemonade seems scarcely to be known, and lemons themselves are not plentiful, their place being taken by the lime which is essentially a small lemon.

Jamaica's principal fruit, regarded from the monetary point of view, is the banana. Immense areas are now devoted to its culture and whole towns depend upon it for their prosperity. The fruit goes to both the English and American markets and requires a large fleet of boats constantly plying between the ports of the two countries to meet the demand. All good Jamaicans must daily thank heaven that Americans have such fondness for the banana. The bunch of bananas have ceased to be a novelty even in our farthest backwoods towns, but the plant from which it comes would scarcely be recognized in many places. In respects it is like a great corn-stalk, but with much broader leaves, so broad, in fact, that the natives use them for umbrellas when caught in a storm. Each stalk produces a single bunch of fruit. In market these bunches are usually hung up with the fruit pointing toward the earth, and this is the way they begin life on the plant, but as the weight of the bunch increases; it bends the stem so that at maturity they point upward. Beyond the bunch of fruit the stem extends for a foot or more in a scaly tail with a bunch of purplish bracts and sterile flowers at the end.

Like oranges, bananas are not allowed to ripen on the plant, even for home consumption; in fact, it is considered an indication of extreme shiftlessness to allow them to ripen thus. As soon as the bunch is "full" the whole stalk that bore it is cut down and another from the same root takes its place. The price varies with the seasons, but it is not unusual for the culti-

vator to receive but sixpence a bunch of nine "hands" as the clusters of fruit are called, and threepence for one with seven handes. Smaller bunches are not accepted for export at any price.

Although a large amount of grape-fruit annually comes to our markets, it seems practically unknown except in the cities. To all intents it is a kind of large orange, being constructed like that fruit, but with a flavor that is all its own and like nothing else. In some places it is disliked because of a bitter taste in the membrane surrounding the sections of pulp, but in its home it has no trace of this and would seem to grow bitter only when obliged to go to foreign markets. It is usually eaten by being cut across the sections, the centre where the sections meet cut out with a sharp knife and filled with sugar, the pulp mixed up with a fork and finally carried to the mouth with a spoon. The shaddock is often regarded as but another name for the grape-fruit, but there are a few minor differences. The shaddock tree is like an apple tree in appearance and in the proper season is loaded down with fruit of truly monstrous proportions. This fruit is shaped like a pear, but its size and weight suggest the idea that it was once round and has sagged down in this shape through the sheer fatigue of holding on to the tree. The pulp is coarser than that of the grape-fruit but otherwise much resembles it. The citron is allied to the same class of plants but looks more like a very large lemon. It has an exceedingly thick rind and a coarse acid pulp. The rind is about the only part used, being generally candied.

Of the fruits that rarely come to our markets, the mango easily stands at the head. It is said to originally have been introduced into the West Indies from India, but now has become thoroughly naturalized. In its season it is the chief, if not the whole subsistence of the negroes. While mangoes are plentiful, it is difficult to get a negro to work at all. He

sees no need of it so long as his food can be had for nothing. This fruit diet is not without its effects upon the bodies of the people; the children especially, usually measure much more around the abdomen than anywhere else. The mango is like a plum in appearance with a thin yellowish or reddish skin and salmon colored flesh. It is most delicious stewed, but is usually peeled and eaten raw. The flesh is soft and juicy and the novice seldom handles it with becoming dexterity. There is a saying that one must take a bath after eating it. The difficulty in handling it is increased by a single large seed in the center, covered with long hairs that ramify through the pulp, rendering eating it very much like sucking a bunch of cotton. Since the mango grows wild, there are all sorts and conditions of fruit from the turpentine mango, which is all its name indicates, to the famous "No. 11." The latter is the *ne plus ultra* of mangoes but a very fugacious object, and some doubt whether such a thing really exists. One is always informed that a particularly fine fruit "looks like a No. 11" or is "nearly as good as a No. 11," but few if any have seen the real thing. There is so much difference of opinion that the skeptical are inclined to consider it a sort of mythical standard of excellence. The better class of mangoes are agreeably flavored, stand transportation well, and would no doubt, find a ready sale in America if better known.

After the mango comes the star apple in point of value. It is a round smooth fruit the size of a large apple and constructed very much like the persimmon of our Southern States. So nearly alike are the two, that to judge from the fruit alone, one would be inclined to call this a new sort of persimmon. The skin is sometimes green, but usually is of a deep purple color like that of the common egg-plant of the gardens. In the center are several seeds enclosed in half-gristly envelopes and surrounded by an agreeable, soft, milky, white or purple pulp. When the fruit is cut across, the arrangement of the

seeds makes a star from which the fruit gets its name. For the table, the pulp is often combined with orange juice and is then called "matrimony."

The average civilized man approaches the custard-apple with misgivings and leaves it with disgust, and yet in this fruit, Nature came near to producing one of her best creations. In its present state, however, it is likely to impress one as being unfinished; as a fruit abruptly halted on its way to perfection. It is a round or eggshaped affair of yellow color and as large as ones two fists. Its substance is soft and custard-like, but after tasting it, one is inclined to believe that this particular custard was not baked enough, or that it was not concocted by a master cook. It tastes for all the world like flour and water with a dash of lemon and slightly sweetened. There is no use going to the tropics for the custard apple when one can get uncooked flour paste and sugar at home.

The sour-sop is some improvement upon the custard-apple, but not enough to make much difference in value. In shape, size and structure they are much alike, but the outside of the sour-sop is warty and encloses a somewhat firmer pulp. There is considerable acid in its composition, but it had the same raw taste as the custard-apple. It is only endurable to most palates when made into a drink by pouring boiling water upon it. It then has the look and taste of sweetened buttermilk.

The reputed fondness of the American for sweets follows him to the tropics and among the first fruits to be recommended to his consideration is likely to be the naseberry. This is not a berry at all, in fact tropical berries are few and far between. It is probably the sweetest of tropical fruits, but has only sweetness to recommend it. It resembles the star apple in structure and belongs to the same family of plants. The skin is rough and of a swarthy brown and the flesh is nearly of the same color. The latter is soft and juicy, but coarse grained and

has been likened, by one not over enthusiastic traveler, to brown paper pulp sweetened. It also has a faint pear-like flavor. The negroes consume large quantities of it.

A familiar and characteristic sight in all lowland towns is that of the bread-fruit tree, with its short stubby branches, broad leaves and round green fruits. The latter is borne upright on a short, thick stem and ranges from the size of a croquet ball to that of a man's head. In looks it is like a much enlarged fruit of our button-ball tree. The usual way of preparing it is by roasting. It then tastes and looks like squash.

The much rarer Jack-fruit is own cousin to the bread-fruit, but is not to be mentioned in the same breath. Externally the two are much alike, but the novice will never confuse them because of the jack-fruit's unbearable odor. From its presence all other malodorous vegetables must retire abashed. When it reaches the kitchen, nobody need be told of its arrival. It is therefore seldom admitted to good society, but if one can disassociate the horrid smell and the taste, it will be found to be sweet and melon-like in flavor. The edible part is a yellow glutinous substance in little pockets surrounding the seeds. The seeds are also eaten after being boiled.

Among curious fruits, none are more remarkable than the cashew-nut. Nature seems to have been undecided whether to make a fruit or a nut of this and to have compromised by making both and stringing them on the same stem. One sees a smooth red pulpy fruit, and beyond it at the blossom end a crescent-shaped nut. Evidently the pear-shaped fruit was intended to enclose this nut, but in some way it escaped and carries on business independently. When one first beholds it he can scarcely realize that someone is not playing a joke upon him. The fruit is slightly acid and rather tasteless when raw, but cooked with sugar, forms a very palatable dish. The nut is roasted and tastes very much like the peanut. The real peanut is rare in Jamaica.

We must not, in passing, forget the humble, though exceedingly important gourd or calabash. Our gourd is the fruit of a pumpkin-like vine, but in warmer climes the gourd grows on trees. The individual who rejoiced when struck by a falling apple that pumpkins do not grow on trees, had certainly never visited the tropics. The calabash is often as large as a pumpkin with a hard and woody shell, covered with a thin green rind. Inside it is filled with a mass of seeds and pulp that suggest our gourd, but the two are not related. The natives utilize the calabash in many ways. Their dishes, jars, baskets, water bottles, and in fact most of their household utensils are made from it.

The cocoanut is said to be the most useful tree in the whole world. It is certainly so in the tropics. Sugar, wine, oil, fibre, timber, cloth, and a host of other things are obtained from it. A tree comes into bearing about seven years after planting and bears for a lifetime, not an annual crop, like our nut trees, but in perpetual season. There is always a small cartload of fruit in various stages of development at its crown. Each leaf that puts out is followed by a string of flowers succeeded by several nuts. When growing the cocoanuts are enclosed in a thick husk. The three eye-like spots on the end of the cocoanut are not produced artificially as many suppose. On the tree they are turned toward the stem as if watching to see that it does not let go of the tree until ripe. The cocoanut reaches its full size before the meat within begins to develope. At this stage it contains about a pint of cool, clear, slightly acid, water with a faint cocoanut taste. One may drink this in any quantity without ill effects. It is a most excellent, refreshing and desirable drink in a land where practically all the drinking water is taken from the streams and often without regard to the fact that a large number of colored folks are washing their clothes further up in the same stream. In the towns, venders go about with cartloads of these "water cocoa-

"nuts" which they sell for a cent each. When one wishes to drink, the native chops off the husk at one end as one would sharpen a fence post, and with two deft strokes opens the nut. One thus quaffs from a cup that was never used before and will never be used again.

Only a few of the fruits from a tropical garden have been touched upon in this article. In the markets of the large towns, one always finds a bewildering array of vegetable products and as he walks through the crowded passages and surveys the huge piles of fruit, he feels as if he were visiting some successful horticultural show. Many of the fruits have suggestive and alluring names, as rose apple, sweet-cup, sweet-sop, granadilla, lotus-berry, papaw, mamee, guava, etc. Not all are as pleasing to the taste as their names would indicate, but one finds both interest and amusement in tasting them all.

"PERUSIN'" THE "PENNYRILE" COUNTRY.

BY SADIE F. PRICE

(Concluded)

OUR NEXT drive of twenty miles brought us to a little village among the knobs, a village of perhaps a dozen houses. Unfortunately the day of our journey was a rainy one; but the impulse to dash out into the mud and rain when some especially interesting plant was seen, could not be resisted. The beautiful yellow-fringed orchis, a plant not before found in this State, we gathered in this way. It had ceased raining when we reached the town, and as we drove up to a house on a hill, where we had heard we could obtain good board, we were the cynosure of all eyes. Before night it was known to all the town that "a woman that's huntin' weeds," was among them.

We sallied forth the first morning, following our young guide single file, through the Jimson weeds and bouncing Bet of the streets, armed with collecting outfit, lunch basket, and

kodak for a day under the cliffs. We wondered what they thought of our extended tramps, as few in this part of the country see any pleasure to be gained from the woods save the manly one of killing something—a bird or a fish, or sometimes larger game. A remark, however, made to us before we left—"Now, if you women jes' had bloomers," showed the light in which we were regarded, and made us see ourselves from their focus.

This locality, as well as the one we had just left, had its "Indian Fort." A favorite name for any oblong knob, in the range of hills, was "Potatoe Hill." One hill of this name, over a mile long, was surrounded by cliffs that were worn into many picturesque grottoes. One of them, Buzzard's Cave, was quite large, and served us as a pleasant retreat for a noon-day meal, or during a sudden shower. Our freckle-faced, bare-footed guide told us where we should find the "mostest fyarns," and asked many questions about "the street cyars that ran with a wire," "Wasn't ther nothin' pretty in town that you should come up heah to hunt somethin' pretty?" he inquired. He had perfect faith, that if called, the "doodle bugs" would come up out of their dens. His faith was so genuine that it gave us great pleasure to keep him calling the ant-lions at their traps in the soft sand,—little hollows in the earth where each insect waits with open arms, so to speak, for an intruding ant. This insect has been immortalized by Riley.

"An' nen he showed us little holes
All bored there in the ground,
An' little weenty heaps o' dust
'At's piled there all around.
That wus the Doodle-Bug's charm—
To call 'em up he said :—
'Doodle! Doodle! Doodle-Bugs!
Come up an' git some bread!"

The boy's faith did not flag,—even after repeated failures—at their non-appearance, and when, only with the assistance of a hair-pin, was one unearthehd, he still did not lose confidence that they usually came when called. We watched one of these grotesque little creatures excavating its house. It worked beneath the earth, travelling backward, round and round, tossing the sand, sending it twice the length of its own body, till it fell in a tiny shower far from the hole. When it had made a perfectly round depression, an inch deep, it waited, with only the tips of its antennae uncovered, for its unwary prey.

Nolin River, a small stream that flows into Green River, of whose wild and grand scenery we had often heard, was the next point of interest that we visited. Though it was off the general line of travel and away from railroads, we were not deterred from going. In the local vernacular, we went to the "yan side" of the river. We drove four miles towards the river in a farm wagon. Our driver and guide could have posed for Riley's "Raggedy Man,"—a more ragged and also more listless and spiritless creature I had never before beheld. He surprised us by saying as we passed a cave in the cliff,— "If I was in the moonshinin' business now, I wouldn't want nothin, better' this place." He "holped his daddy when he was in that business," he said.

We found board at a log cabin near the little river. The bare-footed wife and children crowded about us and we learned much of life among these wild hills and cliffs. The husband, too, had been a moonshiner, and he told us with pride that he had "only been took up four times." After seeing so much of these endless caves and cliffs one is quite surprised that the revenue officers ever succeeded in finding these law-breakers. When I expressed as much to this man, he said that they would never have found his "still" if a neighbor had not got mad and reported him. They speak of moonshining—of

course protesting that they are out of it now,—as one would of mercantile or any other business. The old man said there was no other way, after the war, to support his family. These haunts of the moonshiners and the mounds of the aborigines scattered about, recalled to us many of Craddock's characters. We thought of the graves of the "Stranger People" and could almost distinguish "leetle Moses'" voice among the bird voices.

The rich, full notes of the summer red-bird, the wood-thrush and the Kentucky cardinal, or cardinal grosbeak and the ever-present mocking wren, filled the woods with melody, while the call of the partridge sounded along the roadsides. The mocking-bird, that "trim Shakespeare of the trees" was heard, his interesting relative, the brown Thrasher, was here, too. He would cease to sing as we stopped to listen, and then, as we kept quiet, he began again, low and sweet; so low and clear, we could almost imagine, if we did not see the bird half-hidden by the leaves, that he was at least a quarter of a mile away. He was a veritable ventriloquist, and was trying to deceive us as to his distance from us. Finally growing bolder he would pour forth a rich melody unequalled by any Southern songster save the mocking bird. We heard many stories of the number of "rattlers" and copperheads to be seen here, till pictures of Elsie Venner's cave passed before us, but we saw none in our rambles.

In the State report, this part of the country is thus described: "All its water-courses, even the smallest, wet-weather brooks and spring branches, take their rise between a series of steep cliffs, which form an elevated water-shed between Bear Creek and Nolin River, running in parallel courses, for five or ten miles apart, for a distance of twenty miles. This water shed is intersected on either side by deep, high-walled ravines whence gush forth cool springs, which either

sink in the porous sandstone or murmur and plunge headlong to these rapid creeks."

The forests here are a generation older than those in adjoining countries, and the trees much larger. The country has evidently been burned over at an earlier date than other parts of "the barrens." But the county is fast being denuded of these large trees. Many companies, each employing two and three-hundred men, are at work in different parts of the county, cutting trees for cross-ties. Many lordly chestnut and other oaks, have been felled, and still the work goes on. The deep gulches cut by these two streams, Nolin and Bear Creeks, considerably modify the climate. In the gulches, at least, and between the ridges of sandstone and conglomerate, the extremes of heat and cold are greatly reduced; but when the country is laid bare of its trees there is likely to be a greater climatic change, as well as the disappearance of many plants now found there.

A walk of a mile, after leaving the moonshiner's house, brought us to Nolin River. We were ferried across in a "dinky boat"—a clumsy affair, like a ferry-boat, but with a small room at one end with machinery for raising sunken saw-logs. After several heavy rains the river was now high and very swift, the banks muddy and much of the lowlands under water. We toiled through a cornfield that had recently been over-flowed and along a hill-side for "three quarters",—these people seem too indolent to finish a sentence,—but say "it is a *quarter* to yan house;" or "a half to yan hill,"—until we reached Dismal Rock, a perpendicular wall of rock, that was surveyed by the state geologist in 1875 and found to be three hundred feet high. At its base and along the banks were many trees not found elsewhere, among them the large-leaved magnolia, hemlock, Jersey pine, laurel and holly.

A full view of the rock could not be obtained from the base, so we decided to go to the cliffs on the opposite side of

the river. To avoid the muddy lowland again, the guide was sent ahead to secure the "dinky" boat and come up stream for us. It did not take long to discover that we were to see a little of the treacherous side of Nolin River,—a river full of whirlpools and eddies. The river was out of its banks and very rapid, the boat unwieldy, and the guide not a dexterous oarsman. We made slow progress; but when the boy lost an oar, we were at the mercy of the contrary stream, so that to return to the ferry was the only alternative. The boat swung back and forth down the stream, brushing against the willows on one bank, and then on the other, till we finally reached the landing. We passed the "wagon shed," part of the cliff with a natural tunnel beneath, that formed a natural bridge; but the chief point of interest we visited during the day was a certain cliff where the botanist, Prof Hussey, is said to have found, for the first time in this State, the rare fern, *Asplenium Bradleyi*. I went to rediscover its station, and found it, still growing on the face of a high arching rock, with many other ferns about the base. Along the stream the ground was carpeted with them; but the fate of many of them is sealed, as the denuded hills let in the sunshine, in many places, more familiarly than is liked by some of the species.

Under the over-hanging sand-rocks, sheltered from the sun's rays, were spaces of vast extent where the mound builders as well as the Indians had evidently had their homes. This is shown by the many relics that have been found here; by the mounds in the neighborhood and by the mortar holes in the detached masses of sandrock. At one of these, our guide exclaimed, with a knowing air, "This is wher the Injuns ground ther *coffee!*"

Near a cliff where there are two mortar stones there is a large bed of mussel shells, this, too, at quite a distance from the river. In a field in the lowlands between the ridge and the river is a group of limestone slabs, set endwise at regular

distances, about two feet apart. The stones were evidently carried here a distance of a mile or more, as it is this far to a limestone ledge. They were half covered by the roots of a large mulberry tree that had grown between them. These slabs, with the heaps of shells and the mounds not far away, show, no doubt, that this was once a camping ground. The owner of the land reluctantly consented to let us dig under the roots between the stones. We unearthed a few bones, but as these people are all so superstitious in regard to disturbing these places, we desisted from further search.

We made frequent rests in our excursions. These stops too were half the pleasure of the tour. We climbed or walked till some feature of the scenery was especially pleasing, a deep ravine, a tiny water-fall, or immense fallen rocks,—fern-covered, if of sandstone; bare and massive, as though Titans had been at work, if of limestone; or till we reached some cool and enticing spring, that suggested that this would be a good place to dine or rest.

Turning at last homeward we stopped a day or two at a more commodious house than any we had visited. The owner, a Baptist preacher, could neither read nor write. After dinner, though we were anxious to be off to the woods, the old man insisted we should stop to hear him play a tune or two. He opened, what I, with only a casual glance when I entered, supposed to be a small cabinet organ, and began to play. It was, however, one of the music-box kind, worked with treadles. Never shall I forget the extreme torture of that half hour of the warmest afternoon of last July when, with the cool cliffs and caves of the hills in full view, I was compelled to listen to the loud strains of an “organette,” or whatever this particular machine of torture was called. The picture was ludicrous in the extreme, the aldermanic-looking old man, whose avoirdupois was probably three hundred and fifty, dressed in blue and white cottonade, coatless, with

his broad-brimmed hat pushed back from his red, perspiring, smooth-shaven face, working the treadles as energetically as a "scorcher" in a contest. My friend said the contrast between the evident enjoyment of the musician, his face showing extreme bliss as the ear-splitting notes of "Hold the Fort" and "The Sweet Bye and Bye" rent the air, and my expression of exquisite torture as I looked longingly at the hills and green things growing opposite the windows, was worth to her all the fatigue of the journey.

We travelled through a country so novel, and so varied that the incidents here given are only a few of many; for each mile, and every house we entered had its own experience and history. After many weeks spent in this wild, charming country, that in many places seemed so different from the outer world, I could not but think of what changes would come if the projected railroad was built. A railroad will be a great educator, but by its coming, the country will lose much of its picturesqueness. The earth is rich in minerals, iron ore in every cliff, and coal, marl and asphalt in abundance. Hence only a railroad is needed to make some of these people rich. It is too late to take the listless, indolent air from many of them, whose lives have been so barren of interest and motive, but the younger generation would awaken to new energy.

We made the return home by various ways of locomotion, farm-wagon, stage and railroad, with a well-filled botanical case, and with a kindly feeling and often sympathy for these persons so far from the bustle of active life, these dwellers in the wild parts of the "penny-rile country" and on the "yan side o' Nolin."

AN AUGUST OUTING.

BY FRANK DOBBIN.

A SETTING of beautiful scenery always lends an added charm to a botanical excursion. Mountain, forest, lake, stream—what pictures the words conjure up when one

gives a retrospective glance to the trips of the past season or turns over the pages of his notebook. He can hear the tinkle of the waterfall where he first lighted upon some rare plant, or the song of the veery, that made the woods melodious where he found some other long-looked for specimen upon his evening stroll.

It was my privilege to take such a trip during the past summer in the company of Mr. S. H. Burnham of the New York State botanical department. It was in that beautiful region about the head of Lake Champlain—so rich in historical interest and associations. Add to this scene the drowsy haze of August, when summer having passed the climacteric pauses yet awhile ere she gives place to autumn. On such a day we rowed slowly down the creek which enters the head of South Bay, the upper extremity of Lake Champlain. Here we made many interesting finds, as this little stream is particularly rich in the water plants. The first to attract our attention was the white water crowfoot, (*Batrachium divaricatum*). Farther down the creek I saw for the first time the great bladderwort, (*Utricularia vulgaris*) in flower. This was found in a backset of the creek proper and here the water was so choked with water plants that it was hard to force the boat through their clinging masses. The most conspicuous was the water milfoil, (*Myriophyllum heterophyllum*)—resembling when in the water nothing so much as the tail of an angry cat. In this tangle of aquatic plants we also found that somewhat rare water-loving composite, the water marigold, (*Bidens Beckii*) just coming into flower. Here also was the ivy-leaved duckweed, (*Lemna trisula*), the waterweed, (*Elodea Canadensis*) as well as the common water shield, (*Brasenia peltata*). We also noted two of the yellow pond lillies, (*Nuphar Kalmiana*) and the red-disked *Nuphar hybrida* of Peck.

Farther down the stream where it passes along the foot of diameter Precipice, which towers up nearly 1300 feet on the

left, we found the lake cress, (*Nasturtium lacustre*). *Potamogetons* were there in abundance. To me, however, *P. heterophyllus*, *P. praelongus* and *P. obtusifolius* were new. A few plants of that most beautiful of our native water lillies, *Nymphaea tuberosa* were seen. The arrow-head was here in abundance in the shallows and we particularly noted *Sagittaria Engelmanniana* together with the green water arum, (*Peltandra Virginica*), which was sparingly present.

Leaving the creek we climbed far up the foot of the precipice and were rewarded by finding the bladder-nut, (*Staphylea trifolia*). As we were about leaving the precipice on our return up the creek, we put the boat back to examine a curious lichen, near the base of the rock, which proved to be *Umbilicaria velosa*. We had earlier in the day found that semi-aquatic lichen, *Endocarpon fluviatile*. On our homeward way we passed through a lovely glen, locally known as Horse Heaven, and here we found the large twayblade, (*Lepthorches liliifolia*), while a bit farther on we chanced to find the Huron orchis, (*Limnorchis Huronensis*).

The next day an excursion to some small lakes near the head of Lake George resulted in other interesting finds. Among them being Carey's persicaria (*Polygonum Careyi*) and *Lysimachia producta*; also the little humped bladderwort, (*Utricularia gibba*), found upon some apparently floating islands in a small pond. The great find of the day, however, proved to be the whorled bogonia, (*Pogonia verticillata*). Not often is it given to a botanist to see this rare plant growing. Only one small patch of perhaps twenty individuals rewarded our search. Another orchid quite abundant in this swamp, was the checkered rattlesnake plantain, (*Goodyera tesselatum*).

The ferns, too, came in for their share of attention and my notebook shows the addition of Goldie's fern, (*Nephrodium Goldieanum*); the narrow-leaved spleenwort, (*Asplenium an-*

gustifolium) and that curious variety of the Christmas fern known as *Polystichum acrostichoides crispum*. But space will not allow me to enumerate all the plants collected and carried home for further study and future reference. Only those who have made such a trip in the company of an enthusiastic botanist can appreciate its delights.

Shushan, N. Y.

THE BAOBAB.

BY DR. WM. W. BAILEY.

WE Americans are inclined to think that we possess a monopoly of the world's big trees. We were fairly delighted and filled with patriotic pride when the great conifer of California, first named after Wellington, had to be relegated to the genus *Sequoia*.

Our red-woods of the same genus, now alas! fast diminishing before the demand for lumber, are many of them enormous. Many a white pine in our north-eastern woods is a splendid giant. But even before our recognized "big trees" were discovered, the *Adansonia* or baobab was known to travellers, and since then, the great gum-trees, (*Eucalyptus*) of Australia have put in a just claim for size.

The baobab or sour-gourd is a native of many parts of Africa; it rises to seventy or more feet in height, while the diameter of the trunk may be of the astonishing proportion of 100 feet! The large, solitary, white flowers are six inches in length and hang on long stalks. They are succeeded by a hard, woody capsule, eight inches, or sometimes a foot in length, and, in appearance, like a gourd.

The plant is sometimes known as "monkey-head," and was called by Humbolt "the tree of a thousand years." He calls it also "the oldest organic monument of our planet," Adanson, whose name the plant commemorates, made a calculation to show that it must be 5150 years old. It is not stated how firm was his belief in Bishop Usher's chronology.

Livingstone, the orthodox, says: "I would back a true Mowana (the name given it in the neighborhood of Lake Ngami), against a dozen floods, provided you do not boil it in salt water; but I cannot believe that any of these now alive had a chance of being subjected to the experiment, even of the Noachian deluge." The tree has various uses. Its strong fibre furnishes very durable ropes, so that in Bengal it is a common expression, "As secure as an elephant bound with a baobab rope." The pounded leaves are mixed by the Africans with soups under the name of "Lalo." They diminish perspiration and keep the blood healthy. The fruit is a very useful part of the tree. It contains a slightly acid, agreeable pulp, and is frequently eaten, while the expressed juice, mixed with sugar, is a very healthful drink, and employed even as a febrifuge. The branches being short and curving, and the trunk so broad in proportion to the height, the plant assumes a dome-like appearance.

Providence, R. I.

NATURAL HISTORY OR LIFE HISTORY?

TWENTY years ago, the teaching of botany in this state consisted chiefly of plant description and identification principally by means of the flower. That was the kind of botany taught me, and however much it may have been condemned, yet the so-called "analysis of flowers" was a delightful study. I would make long journeys to the woods and along the lake shores and the river valleys that I might have the pleasure of finding a specimen new to me. That was the way I taught botany, and I had my pupils watch for the first spring flowers just as the Audubon people are now doing with the birds. Now it may be that the old way of teaching botany or the old matter that was taught, was not as scientific as more modern methods and subject matter, yet they had at least one virtue and that is they took the pupil out into the woods. If the only object the pupil had was to find a new

flower and a new name, yet he learned unconsciously its habitat, could tell you where to look for others like it and could recognize others as far as he could see them.

Then came the days of the microscope and stains and paraffin, etc., and instead of sending the pupils out into the woods, we had to make sections for them and show them cells and they had to draw and describe from the microscope. Now while the cell is the unit of structure, and while it might seem that there would be the logical place to begin the study of biology, yet a knowledge of cells is not what pupils of high school age should know about first. It is more important that any one should know first the place where liverworts grow and how they look when growing and where one may expect to find them than to know how great a differentiation has taken place among its cells or what is its life history.

I have known college students who have worked out the whole of the life history of *Marchantia* and had never seen the plant growing in its native haunts. I remember well my experience with *Nostoc*. I worked it out in the laboratory and thought I was well acquainted with it, but it was long after I had finished it before I found it and when I did find it, I did not know what it was.

But this is not such a bad thing among college or university students, for they have or ought to have a large background of scientific observation upon which to base their laboratory work, even if it be on plants other than those on which they are working, but for high school pupils of the first year it does make a difference for we must remember that on account of their extreme youth for one thing they have no background upon which to work and in the larger towns and cities they have but little opportunity to learn anything about plants and animals from actual observation.

It is more important first that high school pupils should be able to know mosses and ferns and be able to know where

to find what plants they want than to know what is meant by the alternation of generations. In other words it is of first importance that high school pupils know the natural history of a large number of plants than their life history. Then laboratory work will have meaning.—*From an article by D. R. Ellabarger in School Science and Mathematics.*

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

WARNING COLORS OF FLOWERS.—Herman Muller notes in one of his books, that the European poppy (*Papaver rhoeas*) is not grazed by herbivorous animals, and he regards the glowing red of the flowers as a warning or “terrifying” color that announces to the cattle, that the plant contains poisonous juices. It is quite possible this is true, but red is not always a terrifying color to cattle. People in red jackets seldom botanize twice in pastures if the king of the herd happens to spy them. The color of the jacket is likely to cause terror in the wearer, however.

FOLK-LORE OF PLANTS.—In the December number of your journal, I ran across a note by Earl Lynd Johnston, of Evans, Colo., on the folk-lore of plants and meterology. This is, of course, a large topic in itself, and like all branches of folk-lore has never been exhaustively treated or even fully studied. Allow me, however, to point out to your correspondent a few of the chief sources. For the person desirous of look-

ing further into this interesting subject, a general reference may be given to the special articles on superstitions concerning plants and the weather that have appeared in the Chap. XIV of "Current Superstitions" (Vol. IV 1896 of the Memoirs of the Am. Folk-Lore Society) by Mrs. Fanny D. Bergen, and Chap. XI of the same author's—"Animal and Plant Lore" (Vol. VII, 1899 of said Memoirs) refer to this topic in particular. Mrs. Bergen's volumes are the most considerable collections of animal and plant superstitions made in England and America, and her numerous lists of American plant names (an important and interesting branch of folk-lore study) are the chief contributions of the sort in America.—*Veritas.*

COMMERCIAL BAST.—Several of our most important textile fibers, such as flax and hemp, are obtained from the soft bast of various plants, but it is seldom that this bast is so well developed in any species that it may be used like cloth without being woven. In the limes or lindens (*Tilia*) the bast is so well developed in the bark that the trees are often popularly known as bass-woods and mats are often made from the bark and used by gardeners for protecting cold frames, etc. The best known example of bast that is coherent enough to appear like cloth is no doubt the lace-bark tree (*Lagetta lintearia*) of the West Indies. This bark by soaking in water and beating may be separated into many regular layers as soft and white as lace and yet strong enough to be used in making party dresses. The bast that has the greatest use in manufactures, however, is a tropical India product. It is sometimes called nava fiber and it the product of *Sterculia Balanghas*. As it comes to our markets it is a yellowish white fabric a foot or more wide, often twenty feet long, and the best of it, as soft and delicate as good grades of cotton, though the meshes of the substance are much larger than those of cloth of like texture. The weaving of this bast, however, is entirely of Nature's

doing, though this is not easy to believe when examining it for the first time. The fiber under the name of bass is largely used in cigar factories for tying up bundles of cigars. We are indebted to Dr. William Trelease of the Missouri Botanical Garden for the identification of specimens. Dr. Trelease writes that he recently saw in the possession of Dr. C. F. Millspaugh of the Field Museum some foreign cigars, each of which had been wrapped in a sheet of this bast, much as a bottle is sometimes wrapped in a thin veneer of cottonwood or other protective material.

DIANA'S PAINT-BRUSH.—It may be quite possible that poetic New Englanders, as Dr. Bailey reports, have given the name of Diana's paint-brush to the orange hawk-weed (*Hieracium aurantiacum*), but in eastern Pennsylvania, where this detestable weed has painted square miles of fields with red, the farmers have given it a more appropriate name. They still call it paint-brush, but the owner of the brush is there said to be a certain subphurous individual, whose only resemblance to Diana is that his name begins with the same initial.

PLANTS WITH PECULIAR NAMES.—The common names of plants are most convenient handles at times, but the scientific names also have their uses. We might better use the latter than some of the common names in use among gardeners. A writer in *Florida Agriculturist* mentions some of these as follows: A friend of mine, living in the far West once wrote me that a friend had sent her some plants. Among them a "Joseph's coat of many colors," an angel's wing, "the forbidden fruit," and "the wandering Jew." She seemed so delighted over those plants, that I concluded to increase still further her happiness, by sending her "celestial bride," the "star of Bethlehem," and "Solomon's seal." I sent, also, "the cross of Jerusalem," "Jacob's ladder," and "Job's tears." Enough, surely, to satisfy her ambitions in the way of plants

with peculiar names.—[Without going into the gardener's list, we could add from the botanical manuals, butter-and-eggs, brown-eyed Susan, Dutchman's breeches and bloody noses. —*Edl.*]

PLANT DISTRIBUTION—When one sees the water cress (*Nasturtium officinale*) so common along our streams he is led to wonder from whence it came, also how and when. I have heard a number of persons say that it was introduced into Colorado, by the soldiers at the many Forts found within the State in early days. This plant has a reputed medical quality, that of relieving, and, in some cases of curing, the scurvy and hence was planted for this purpose. As to the correctness of this I do not know. If one tastes this plant he finds it not unwholesome with its very marked *Brassica* acridness. If any other reader of the BOTANIST has heard anything relating to this plant could we not have it made public through this great clearing house of botanical knowledge?—*Earl Lynd Johnston, Evans, Colo.*

THE CAUSE OF ANNUALS.—Undoubtedly annual plants have arisen in response to more than one set of conditions, but it is an interesting fact that dry regions greatly favor the production of such plants. This is of course due to the fact that annuals can spring up after the rains, and mature their seeds before overtaken by drouth. The more deliberate perennial plants find this impossible. Alpine and Arctic conditions, on the contrary, favor the existence of perennial plants. Moist tropical regions also produce a large number of perennials, but the tropical perennials differ from the Arctic perennials in one important particular. In the tropics the perennials of dry regions are, nearly all of them, like those of Arctic regions in having the perennial parts underground, though the conditions, that necessitate this are so widely different. Bulbous plants usually form the great majority of dry ground perennials.

EDITORIAL

We are inclined to believe that during the past half year the numbers of this magazine have been a distinct improvement over any that have preceded them, and the complimentary expressions with which correspondents frequently favor us, show that they too appreciate the efforts we are making to produce a good magazine. We should like at once to make this magazine as big as any dollar literary magazine on the market, but an experience of many years has shown that a successful botanical magazine is of slow growth. It takes time and discrimination on the part of the public to distinguish between a mere picture book and a magazine of solid information. As between any of the literary magazines and ours there can be no comparison. It all depends upon what you want. If it is botanical information, fifty dollars invested in the big magazines will not bring the returns that fifty cents will, if invested in **THE AMERICAN BOTANIST**. But until we accumulate subscribers enough to warrant an enlargement, we purpose continuing in the usual way making the magazine as good as its patronage deserves and looking forward to the time when it is sure to have a much wider circle of readers and a greater number of pages. As it is, the amount of actual information we offer in a year is, we think, worth the price charged and with the certainty that the numbers for 1907 will be better than ever, we earnestly invite all whose subscriptions expire with this number, not only to renew, but to help us toward that much-to-be-desired increase of circulation, by sending us the names or subscriptions of others interested.

* * *

As usual, we send out with this issue bills to all who are in arrears for subscriptions. In order to make subscribing as easy as possible, we allow subscriptions to be paid during

the year when most convenient, but when expired subscriptions extend beyond this time, we find it necessary to send them to a collecting agency for investigation. Sometimes the only way we have of discovering that a subscriber is dead, is by asking the agency to look him up. We trust that none of our subscribers in arrears are dead, but if not, we also trust that we shall hear from them. We can say truthfully that thus far we have not lost a single subscriber by death, whose subscription was paid in advance. As a mere matter of precaution, we suggest that those in arrears pay up.

* * *

As the single numbers of this magazine come to hand, readers may fail to appreciate the amount of valuable information they are getting for a dollar, but take up the year's numbers, and you will find you have a larger volume on plants than can be bought elsewhere for a dollar. It takes time to make the value of the magazine apparent. We know this because we sell more back numbers to old subscribers than we do to new ones. After they have been reading the magazine a while they seldom fail to order the volumes they do not have. If you doubt that the back numbers are still of interest, take another look at any of them. There are a lot of things there that you had forgotten already, we will venture.

* * *

Clumsy man will apparently never relax his efforts to "gild the lily and adorn the rose." Almost every attempt he has made to improve upon nature in the matter of flowers has been directed toward the mere addition of more flaunting colors. The chrysanthemum has been "improved" from a beautiful daisy-like flower to an ugly mop of yellow, pink or white strings as big as a cabbage. A tissue-paper imitation has quite as much claim to our admiration. There are, to be sure, certain flowers whose shapes lend themselves more readily to the florist's art than others, and of these the rose

and carnation may be cited as examples. Nature even points the way in such flowers as the water-lily and lotus, and in less measure in mandrake, magnolia, barberry, and hepatica. All these, it will be noticed are simply saucer-like flowers, possessing no special beauty of form. But when it comes to others, whose first claim to attraction is in the marvellous fashioning of the flower cup, man's barbaric taste in matters of beauty is revealed in all its ugliness. Double morning glories, petunias, bellworts and others are in the botanical sense monstrosities and they are no less monstrosities in any esthetic sense. Half the charm of the daffodil and narcissus lies in the clear cup outlined in the center of the flower. To double such a flower, is to render it worthless, if measured by any standard of beauty, except that of a savage. To really improve a flower, we ought to strengthen and deepen those qualities that give it beauty. To enlarge the parts, to increase the clearness of their coloring, to add to the delicacy of their perfume and the texture of their petals may well be among our aims, but if a mere display of colored petal is sought, why bother with flowers at all when something just as good can be made in half the time by a three-dollar-a-week girl with a few pieces of wire and some colored cloth or paper?

* * *

In the *Plant World* for October is an article by Prof. J. C. Arthur on the delayed germination in the cocklebur (*Xanthium*) in which the author seems to be still in the dark as to the reason why the upper of the two seeds in the bur does not germinate readily under normal conditions. If the editors of the *Plant World* will consult recent numbers of the *Botanical Gazette*, or even read carefully THE AMERICAN BOTANIST, they will find that Mr. William Crocker has discovered that the delay is due to the completeness with which the seed-coat of the upper seed excludes oxygen.

THE AMERICAN BOTANIST

DEVOTED TO ECONOMIC
AND ECOLOGICAL BOTANY



EDITED BY WILLARD N. CLUTE

•

Volume XII

JOLIET, ILLINOIS
WILLARD N. CLUTE & COMPANY
1907

CONTENTS

CONTRIBUTED ARTICLES.

Ailanthus,.....	<i>Dr. W. W. Bailey,</i>	36
An Afternoon in the Helderbergs,.....	<i>Frank Dobbin,</i>	78
A New Blueberry from New York, <i>Stewart H. Burnham,</i>		8
Collinsia Verna,.....	<i>Willard N. Clute,</i>	73
Early Blossoms,.....	<i>Frank Dobbin,</i>	37
Lianes,.....	<i>Dr. W. W. Bailey,</i>	75
Sage-Brush and Cactus,.....	<i>Earl Lynd Johnston,</i>	59
Solomon's Seal,.....	<i>Dr. W. W. Bailey,</i>	49
Some Foreign Nuts,.....	<i>Pauline Kaufman,</i>	3
Some Inconspicuous Flowers,.....	<i>Willard N. Clute,</i>	33
Some Spring Flowers,.....	<i>Willard N. Clute,</i>	56
Some Wood-Destroying Fungi,.....	<i>L. A. Hausman,</i>	51
Spring in Stony Park,.....	<i>Leston A. Wheeler,</i>	30
Squashes and Gourds,.....	<i>Dr. W. W. Bailey,</i>	1
Wayside Flowers,.....	<i>Dr. W. W. Bailey,</i>	101
Why and How to Begin the Study of Fungi,	<i>Stafford C. Edwards,</i>	97
The Advent of Spring,.....	<i>Willard N. Clute,</i>	4
The Common Bracken as Food,.....	<i>Anna C. Dalgity,</i>	25
Trees Injured by the Seventeen-Year Cicada,	<i>H. C. Skeels,</i>	9
Editorial.....	22, 46, 70, 94, 122	
Books and Writers.....	47, 72, 95, 124	

REPRINTED ARTICLES.

Our Bird's Nest Fungi.....	79
The Great Primeval Forest.....	108
The Pine-Barrens of New Jersey.....	103
The Pistachio Nut.....	39

NOTE AND COMMENT.

Acacia, black, Seed stalk of..	84	Nomenclature Again.....	114
Aerenchyma	81	Nomenclature, Changes in..	88
Antiquity of the Carnation..	14	Peach and Plum Leather....	119
Arrow-head Potatoes.....	41	Peloria	66
Beans, Knowing.....	112	Perennials, Growth of.....	121
Birds as Botanists.....	16, 64	Petals, Origin of.....	42
Bracken protected by Law..	87	Photography with Plant	
Bud-scales, Function of.....	19	Juices	14
Burning-bush, Honey Guides of	119	Pistils of Partridge Pea,	
Buttercups and Daisies.....	113	Twinned	65
Cactus, Defences of.....	89	Plant Distribution.....	86
Cauliflory	69	Plant Stimuli.....	15
Carnation, Antiquity of....	14	Plants, Protective Coverings of	17
Cleistogamous flowers.....	19	Plur-Annuals	44
Croton tinctorum.....	82	Pollination in Evening	
Dandelions as Food.....	92	Primrose	86
Dandelions Fasciated.....	117	Polyembryony	118
Drouth and Cold.....	90	Pubescence of Plants.....	66
Earth Stars, The.....	120	Root-Climbers	42
Farmer's Mental Equipment	117	Roots, Direction taken by...	67
Fern, A Flowering.....	21	Seed dispersal, Ants and....	85
Ferns, Edible.....	65, 89	Seed-Stalk of Black Acacia..	84
Floral Numbers, Origin of..	90	Seeds, Vitality of.....	82
Flowers, Edible.....	116	Smoking, Materials for.....	45
Flowers, Scarlet, and Drouth	68	Snails, Flowers Pollinated by	18
Fruit and Temperature.....	87	Solomon's Seal, orientation of	18
Fruits, Proliferation of.....	20	Species-making Craze, The..	21
Fungi, Wood-staining.....	17	Sumac, Cut-leaved, Origin of	92
Fungus Coloring.....	43	Sassafras	121
Growth of Plants, Rapid....	68	Toad-flax, Variations in....	43
Heliotropism of the Water Fern	85	Trillium, A Yellow.....	83
Honey Guides of Burning bush	119	Tuber, Proper definition of..	20
Horehound for the Million..	113	Trees Injured.....	120
Hybrids, Wild.....	16	Verjuice	111
Insects, Flowers Modified by	40	Violet Hybrids.....	111
Luminous Plants.....	15	Water Fern, Heliotropism of the.....	85
Lychnis alba, Range of.....	118	Wild Flowers, Pennsylvania	115
Mustard as a pot-herb.....	93	Woodbine Climbs, The Way	91
Nature's Exactness.....	114	Wood-staining Fungi.....	17
Nectaries, Location of.....	41	Xerophyllum asphodeloides..	64

VOL. 12 FEBRUARY, 1907 NO. 1

THE AMERICAN BOTANIST

—
10
CENTS
A
COPY
\$1.00
A
YEAR
—

CONTENTS

SQUASHES AND GOURDS	1
Dr. W. W. Bailey.	
SOME FOREIGN NUTS	3
Pauline Kaufman.	
THE ADVENT OF SPRING	4
Willard N. Clute.	
A NEW BLUEBERRY FROM NEW	
YORK	8
Stewart W. Burnham.	
TREES INJURED BY THE CICADA	9
H. C. Skeels.	
NOTE AND COMMENT	14
EDITORIAL	22

WILLARD N. CLUTE & CO.
JOLIET, ILLINOIS

The American Botanist

A MONTHLY JOURNAL FOR THE PLANT LOVER

Issued on the 15th of each month except July and August.

WILLARD N. CLUTE  EDITOR

SPECIAL NOTICE.—This magazine is issued in two half-yearly volumes of five numbers each. Subscriptions \$1.00 a year. All subscriptions must begin with a volume. To avoid the loss of numbers to regular subscribers, the magazine is sent until we are notified to discontinue and all arrearage paid. No one receives the magazine free except by special arrangement.

SAMPLE COPIES.—One cannot always judge of a magazine by a single number. Those who receive extra copies are asked to give them a careful examination. We know when a plant lover becomes familiar with the contents of this magazine he invariably becomes a subscriber. A single number may often be worth more than is charged for a year's subscription. The full set is almost a necessity to the plant student.

WILLARD N. CLUTE & CO., Publishers, 309 Whitley Ave., Joliet, Ill.

Entered as mail matter of the second class at the post office, Joliet, Ill.

THE AMATEUR NATURALIST

SAMPLE COPIES FOR
THE ASKING

The only Popular Magazine devoted exclusively to general Nature Study that is untechnical, yet scientifically accurate. It publishes the things you want to know about plant life, birds, animals, insects, minerals, etc., and interesting discoveries in astronomy, chemistry, geology, physics, and other natural sciences. Subscription, 50 cents a year.

CHAS. D. PENDELL, PUBLISHER, ASHLAND, ME.

THE OOLOGIST



A monthly publication devoted to Oology, Ornithology and Taxidermy. Published by Frank H. Lathlin, M. D., Albion, New York. The Oldest, Cheapest and Most Popular

BIRD PUBLICATION

in America. The best exchange and war columns. Question and answer columns open to Collectors and Students in every branch of Natural History. An entire year with free 25c exchange notice coupon only 50c. Sample copy on application. Address

Ernest H. Short

Editor and Manager

CHILI, N. Y.

Mycological Bulletin

Natural Size Illustrations

MUSHROOMS

A little magazine for beginners and amateurs, telling something about

Poisonous and Edible
Toadstools and 
Mushrooms 

All in Plain Language

Published Monthly Price 25c a Year
Address W. A. Kellerman, Columbus, Ohio.





WILD BALSAM APPLE.—*Echinocystis lobata*.

THE AMERICAN BOTANIST

VOL. XII.

JOLIET, ILL., FEBRUARY, 1907.

No. 1

SQUASHES AND GOURDS

BY DR. W. W. BAILEY.

WITH the possible exception of maize or Indian corn, no plant has received so much attention from the botanical histologist as pumpkin or squash (*Cucurbita Pepo*). Its ready accessibility, ready and rapid growth, life confined at most to a few months, and hence quickly exhibiting its complete history from seed to fruit, make it especially attractive to the student. It is easily sectioned for gross work, and its flowers, too, are interesting. These show a very curious circumflex anther, resulting from the coalescence of several. The plants are monoecious, and the pistillate flower can always be distinguished by the projecting ovary beneath.

Besides the various squashes, pumpkins and vegetable-marrows (sacred to Mrs. Nickleby!), there are many related plants. The larger family assemblage embraces gourds, melons in all their varieties, the cool, refreshing cucumber, adopted as a type of moral and physical calm and indifference; the wild balsam-apple (*Echinocystis lobata*), that beautiful nuisance so abundant about our cities, and its cousin, the star-cucumber (*Sicyos angulatus*), equally prevalent and very unsightly, and in Europe the pretty bryonia twining or climbing over copses.

All the squash family are climbers or trailers—plants which in football terms, succeed by “going round the ends”—or by strategic passes not requiring physical strength. “Those also serve,” in the struggle for life, who take advantage of every opportunity to advance. When they possess tendrils, they are opposite to the leaves and hence usually regarded as attenuated stem axes, the main growth being continued by a

bud more vigorous than theirs. These tendrils reach out like fingers till they catch some support. Then the tips coil around any obstacle, get a good grip and by increase of tension pull the plant nearer to the support.

Now, as it might happen that the constant torsion in one direction would break the tendril, it, after a while, reverses the direction of the twist, so that one commonly finds in the middle of the helix, a short, straight piece.

The squirting cucumber (*Momordica elaterium*) is one of the freaks of this interesting family. It is a plant of the Mediterranean region of Europe, with small yellow flowers. These are followed by a cucumber-like fruit, beset with weak prickles. The pedicel projecting into the wall substance of the fruit, terminates in an enlarged portion that may be compared to a bottle stopper. The fruits are pendent. When ripe, the tissues of the wall break down, the stopper is released, and the fruit disengaged from the vine. Simultaneously, there is ejected from the opening a jet of mucilaginous liquid, carrying the seeds in suspension. It is quite likely that the emulsion is thrown upon some grazing animal, and later rubbed off in some new locality—ensuring distribution and changed environment.

While so many of the Cucurbits are in part edible, there are noxious members among them, and even the familiar table fruits bear watching, say as regards their rind. Most of them are acid, and some are powerful purgatives, notably colocynth or bitter apple, supposed to be the Wild Gourd of Scripture. As every one knows, especially at the South, gourds are natural dippers, pitchers, cups and basins, almost ready to hand, and often beautiful from their natural curves and colors.

The "gaudy melon flower—the little children's dower" of Browning, is not so brilliant or gorgeous as that of our squash, a thing of beauty, a tent of cloth of gold. Its yellow

too, has all sorts of fascinating crinkles and curves. The plant sprawls about over the ground and rarely shows any particular resort to its tendrils. Perhaps it is slowly abandoning an old habit—or, is it, on the other hand, acquiring a new one? There is a chance for the philosopher to speculate.

The squash plant loves to make a dash for freedom, and to tumble out of the garden bed down an embankment, or to scale some stone wall not too high. Squashes and pumpkins—we now speak of the fruit—in late autumn love to expose their golden sides, Midas-touched, to the sun. They seem types of utmost prosperity—suggesting bounteous dinners and the re-gathered family. Always we expect to see Cinderella's coachman, in fairy livery bedight, step up and take possession of the plumpest. A fitting gift for carriage purposes surely—better than costly motor even, from any fairy God-mother.

Brown University, Providence, R. I.

SOME FOREIGN NUTS

BY MISS PAULINE KAUFMAN.

WE HAVE so much foreign food material in daily use that it takes something very striking to attract notice. Under this head comes what the dealer calls the paradise nut, a name, though richly deserved, recognized by neither dictionary, botany nor any work on horticulture. More success attends the botanical name *Lecythis ollaris*, or pot-tree of Brazil. The tree belongs to the Myrtle family (*Myrtaceae*). Its leathery leaves are alternate, and the clusters of large flowers are borne in a raceme. The hard woody capsule, bearing the nut-like seeds, is about six inches in diameter, shaped like a vase or urn, with a circular lid, two inches across. When the fruit has reached maturity, the lid opens with a sharp report, scattering the nuts, and giving the glad tiding to the monkeys in the neighborhood. The nuts or seeds are from two to three

inches long, three inches in circumference in the widest part, tapering to a rounded point at the lower end. The shell is of a cork-like texture, though not as soft as cork, and has a number of ridges and grooves. These meet in a blunt point at the upper end. The shells, easily opened, even by the pressure of a light foot, disclose a long kernel, which at once shows kinship to the Brazil nut, as it also does in taste; but to the latter it is vastly superior, the flavor being most delicately sweet. The empty vase is both useful and ornamental and is called a "monkey pot."

The cashew nut, of which the editor drew so luminous a picture, in the January BOTANIST, is another novelty here. A friend returned from Jamaica, introduced it to us. It has not gained high favor. It resembles a lima bean in looks, and is inferior in taste to be a good peanut.

Pistachio nuts, slightly wasted and salted, have ceased to be a novelty. The market also affords monstrous paper shell pecans three inches long; and the English filberts or cob nuts much larger than our hazel nuts.

New York City.

THE ADVENT OF SPRING

BY WILLARD N. CLUTE.

SPRING belies the calender and is bound by no set dates. Her mingling of snowstorms and sunshine in the early days of her reign is exceedingly perplexing to those who go by the almanac and expect the vernal season to begin without fail on a certain day. Those who are alive to the subtle suggestions of coming mildness, and can feel the pulse of the year, as it were, anticipate no abrupt transitions. In spite of cold and storm they mark the signs of Natures resurrection long before the ordinary observer has noted them.

We commonly feel that in some way spring follows the sun southward, and is not to be expected until that luminary

has again reached a certain height in our heavens; but a ramble along the country side at this time of year, is likely to impress one with the idea that the season has retired underground, instead. In the depths of the pools life is apparently as abundant and as lively as in summer, and on land, down among the dead and yellow grasses, the perennial plants have been showing star-like bits of green all winter. Other storms may come, but these things show us how close in the milder season. Just beneath the surface of the earth, spring bides her time.

The first flower of the year, is supposed to bloom in suburban gardens and to come from the ranks of the snow-drops, hyacinths and crocuses. The truth of the matter is, however, that these imported beauties are all outdistanced and put in the shade, as it were, by a sturdy native American. This species is common in every bit of boggy or marshy ground in the Eastern States and is so impatient to put forth its flowers that it often tries to bloom shortly after Christmas. Although March is its chosen month, specimens in full flower are often found by the middle of January. No care is ever taken to cultivate the plant. By common consent it is given a homely name and left half-buried in the mud of its boggy realms. Yet, if one can but disassociate the flower from its common surroundings and forget its infernal odor, our humble skunk's cabbage appears as handsome a flower as any. Indeed, report has it, that these same blossoms find their way to the larger cities and in the hands of shrewd venders become "black lilies" or "Japanese callas" and readily sell to those who have forgotten their boyhood days or have never seen the country in spring. Aside from its disagreeable odor, the one fault of the plant is its commonness. If it were some rare thing, it would doubtless be sought for our gardens and conservatories as, in fact, it is now, outside the region in which it grows.

While of obscure origin, the skunk's cabbage it not with-

out good "connections." The queenly calla lily is among its nearest of kin, and so is the Jack-in-the-pulpit and the calamus root, these latter well known to country boys at least. In point of beauty, the flower clusters of our plant are a match for many flowers more famous. Its great purplish spathes, curiously mottled with shades of green yellow and brown are among the largest of our native wild-flowers. In shape, too, they are unique, reminding one of some delicate sea-shell enclosing the true flowers, bunched in a round head within. These flowers produce quantities of pollen, a fact of which the honey bee is well aware. It is here that she gets her first pollen and she not infrequently ventures after it so early in the year, that she freezes to death by the way. Other and smaller insects often visit the flowers, and a certain thrifty spider that lives in the bogs takes advantage of this and spreads her web in the spathes.

In New York and New England, the blue-bird and robin are popularly supposed to herald the advance of spring, but the song sparrow is not a bit behind them and but for his retiring ways would probably receive the greatest homage. In the latitude of New York and Chicago his slender pipe is heard long before the others and in mild winters it is doubtful if he leaves several of the northern States at all. The "January thaw" loosens his voice and on all bright days thereafter his tinkling notes may be heard, though to many the song is drowned in the hum of the city, or confused with the noisy chirping of the voluble English sparrow. When the migratory song sparrows come up from the south and the voice of our resident birds takes on more mellowness, spring seems fairly to have begun, no matter what the temperature or the aspect of the sky. These little ground-loving, brown birds seem part of the earth itself and their liquid notes, sprinkled from bush to bush along the thawing stream blend

into harmony with the tinkle of falling icicles and theplash and gurgle of the water.

One who should write a poem to March and place butterflies, flowers and bird's nests in it, would doubtless be handled roughly by the critics as a spring poet who had got ahead of the season, yet such a poem could be written without in the least misrepresenting the facts. In the hemlocks by this time, the crows have begun housekeeping and the little screech owl has stealthily selected a site for her nest in the depths of some hollow tree. The crow is less careful about the concealment of her nest, especially in parks. She is quick to learn and knows her advantages as well as anybody. The owl has the reputation for wisdom, but the crow has the wisdom. In the country where the crows are not protected, they are as wary as ever, but in the parks they are quite fearless as if confident of their immunity.

In February or March a walk on a bright day will often show both caterpillars and butterflies about. The caterpillar, well named the woolly bear—is a hairy animal, brownish red in the middle and black at both ends and seems absolutely careless of the weather. Freezing seems not to harm it. It is frequently found creeping over the snow. A cold day may stop its travels by freezing it stiff, but the next sunny day, it thaws out and goes merrily on. Almost any day now, in the woods, one may chance upon the mourning-cloak butterfly, called from its retreat by the increasing warmth to dance over the dead leaves or flutter about the base of the trees on some warm slope. While flying the dark upper wings with a clay-colored border makes the insect conspicuous, but when it alights upon either tree or rock it seems almost to vanish as if absorbed by the object, so completely does the under surface of its wings which are now closed together over its back, mimic and blend into the colors of its resting place. Although apparently just awakened from a winters sleep,

these insects seem to be preternaturally suspicious. Theirs, however, is a wisdom that comes from experience. Examination of a specimen will show wings that are battered and faded from battling with the elements of a season past, and destined to wave but a short time longer in the one to come. If these aged individuals can remember, what curious experiences they must be able to recall, as they doze away the wintry days, safe hidden beneath a strip of loose bark on some forest tree.

After the first of March, each day sees the signs of spring become more pronounced. The catkins of birch, alder and hazel begin to lengthen, the buds of maple and elm swell almost to bursting, and the twigs of the willow, dog-wood and cat-brier fairly glow with color. Their veins are full, and they but wait the encouragement of a few warm days to border the streams and thickets with tender green.

A NEW BLUEBERRY FROM NEW YORK

BY STEWART H. BURNHAM.

THE species of blueberry, here described, appears to be a well-marked one growing with *Vaccinium Pennsylvanicum* Lam. and *V. vacillans* Kalm. It is, however, more closely related to the latter species, but may be separated, not only by its greener leaves, which are scarcely glaucous, but also by its larger fruit almost destitute of bloom. The flowering and fruiting season is one or two weeks earlier than that of *V. vacillans*.

VACCINIUM DOBBINI, n. sp. An erect shrub, 2½-4 dm. high, with reddish brown or rarely greenish bark, branches greenish, roughened with numerous minute warts, twigs soft pubescent in lines with white hairs. Leaves mostly elliptical, 2½-4 cm. long, 1¼-2½ cm. wide, mucronate, tapering at the base, serrulate with white-tipped teeth, smooth above, green and prominently reticulate-veined beneath and slightly

hairy on the midrib and veins at the base. Flowers in clusters of 2-6, usually borne near the ends of the branches when the leaves are half expanded, on short, stout pedicels, 2-3 mm. long; corolla white, short cylindric or ovoid, constricted at the throat, angled, about 7 mm. long and 5 mm. thick; calyx-lobes smooth, obtuse, green or tinged with red. Fruit dark blue, with little or no bloom, 6-10 mm. in diameter, sweet and well flavored.

Type Station:—Exposed rocky soil, Peaked Rock, Anaquassacook Hills, town of Jackson, Washington county, N. Y.
Dobbin & Burnham: 4 July, 1904, and 19 May, 1906. This species is named for my friend, Frank Dobbin (1873 —); who for several years has made a careful and painstaking study of the Flora of Shushan and vicinity.

Albany, N. Y.

TREES INJURED BY THE SEVENTEEN-YEAR CICADA

BY H. C. SKEELS.

THE seventeen-year cicada made its appearance in the northern part of the Mississippi valley during the year 1905. Throughout the Desplaines valley the forests of oak showed brown and sere during August, because of the fact that the cicada in laying her eggs makes a slit through the bark of the twig, down into the sap wood, thus injuring the branch to such an extent, that a little wind or a heavy rain will break it off or leave it hanging dead and brown on the tree. Some branches showed only a few slits, five or six in a row; others were literally ripped along the bark for a foot or more. Many young trees were so badly riddled, that they lost three years growth, dying down to within a foot of the ground. Branches that were of such diameter as not to be broken because of the slits, were opened up to the attacks

of plant lice and fungi so that the extent of the damage cannot be estimated for several years to come.

The most interesting feature of the cicada work was the very noticeable fact, that, though the ground was covered with injured branches, and the trees generally hung full of them, some trees were not injured at all! The forest of Arden near Joliet, Ill. gave an excellent chance to investigate this fact of the immunity of certain species. The Forest is a three-hundred acre piece of oak and maple woods in which other trees are naturally interspersed. It has been woods ever since the glacial epoch, to go back no farther. The seventeen-year cicada has laid its eggs on these trees and their ancestors through all of that time. Anyone who heard their constant singing during the month of June, would make no question as to the numbers of individuals, and the probability of their finding and using every available place in which to deposit eggs. Nor would there be any doubt that any species not used by the wives of these drummers was exempt because of some quality inherent in its own being.

Another reason why the Forest afforded an excellent means for testing this question, lay in the manner of its planting. While the foundation is a native woodland, the botanical planting has been arranged along the five miles of drives, laid out for landscape purposes; and the planting has been done with the object always in view of keeping the natural wild appearance in predominance. So the planted trees and shrubs are surrounded on all sides by native trees and shrubs growing where the ancestors of these cicadas left them seventeen years ago.

To be explicit, if I have a plantation of about twenty-five species of evergreens, interspersed with gooseberries, dogwoods, ash and willows, and I find these native trees and shrubs ripped almost to pieces, and find only one slit on one

white pine, am I not justified in believing that the cicadas avoided the coniferae because of some inherent quality within these trees? In the same way, when I find the greenbrier climbing over a thorn tree that has had eggs laid on all branches less than one-half inch in diameter, and the brier is not slit at all, I believe it is because the cicadas did not like the greenbrier.

The walnut was used to some extent, the butternut hardly at all. The three species of hickory, bitternut, pignut, and shagbark, were used freely, but the thickness of the twigs prevented their being injured to so large an extent as the smaller twigged trees. The poplars and willows were freely used. I could not help wondering, when noticing the rapidity with which the wounds of these trees healed, if the young cicadas ever found themselves grown in!

The oak family suffered largely; the ironwood, blue-beech, hazel, all birches, alders, chestnuts, oaks, even little trees still in the nursery, being slit and ripped without regard. Indeed, the beechnut plantation, consisting of ten fine trees about five feet high were ripped so vigorously as to be killed back to the ground. The three elms and the hackberry were used somewhat, while the mulberry was skipped entirely, and the tulip tree nearly so. The papaw was also entirely free from injury. There are about five acres of native papaw in the Forest growing among the maples. These maples and youngsters of other sorts among the papaws were ripped and slit as with a rip saw, but the papaw escaped without a single scratch.

The barberries as might be expected, were exempt, as was also the spicebush, while the sweet-scented shrub (*Calycanthus*) was used to a slight extent. There was no sassafras in the Forest, but a native roadside copse near Joliet showed no signs of cicada work. The gooseberries and black cur-

rants were used, but the witch-hazel was nearly exempt. The buttonwood was used slightly.

This brings us to the rose family, where the greatest damage, outside of the maple was done. To begin with, the ninebark and the spireas, native and planted were exempt from taxation, as was the shrubby cinquefoil. But the roses, except possibly *R. humilis*, which was too small, and *R. setigera*, too spiny; the blackberries; the raspberries, red, black, and purple; the apple, cherry, peach, pear, and plum; wild, cultivated, native, European, Siberian, or Japanese; chokecherries, shad-bushes; and thorns were literally cut to pieces! The thornapple, in fact, was the test plant used in case of doubt. It is not possible to stand anywhere in the Forest where there is not a thorn bush or tree in sight. When a tree was found that had not been used, it was necessary only to look at the nearest thorn bush to be assured that the location was liberally supplied with cicadas. And the one-hundred-fifty odd new species from Dr. Sargent were used as freely at the native *mollis*, which is almost a weed. The Judas tree, honey locust, and yellow wood fared as badly, while the Kentucky coffee tree was used only in the nursery, a tree eighteen inches in diameter showing no damage. *Amorpha fruticosa* and the black and hispid locusts seemed to be exempt, but the clammy locust was freely used, as were also the prickly ash and hop tree.

From the burning bush to the buckeye, including the bittersweet, the bladdernut, and all the maples, the cicadas buzzed and sawed to their hearts content; until after a few weeks, the fine green forest canopy turned into a brown and sere mass of broken, hanging twigs, with just enough green to give emphasis to the brown. The buckthorns, the New Jersey tea, the grapes and the Virginia creeper seemed to be untouched, but the basswood and shrubby St. John's wort again cut the list short as the cicadas cut them. The leather wood seemed to be untouched and *Aralia spinosa* hardly

furnished room between the spines. With the dogwoods it was different, all species including the alternate-leaved, silky, Bailey's, panicled, round-leaved, flowering, and red, were used to some extent.

There are no heaths native about Joliet. Of the thirty odd shrubby species planted, only *Clethra* and *Azalea nudiflora* were used by the cicadas. On the other hand, all the ashes, red, white, blue, green, and black, were freely used regardless of color or size. There was one slit on one catalpa, but none on the buttonbush. The black elder was used, but the red seemed to be free. On the other hand, the viburnums, of which ten of the twelve species planted were large enough to be used, were ripped up and down as though they had been planted for that purpose. The snowberry, Indian currant, Sullivant's honeysuckle, and *Diervilla*, were used; the honeysuckle family generally seemed to be well liked.

It is interesting to bring together the list of trees and shrubs, wholly exempt from these devastating marauders, to see all together the species whose bark or sap or odor caused the cicadas to avoid them. Leaving out the evergreens, which one would hardly expect to be used, the list is as follows: greenbrier, mulberry, papaw, spice brush, witch hazel, nine bark, Spirea, shrubby cinquefoil, prairie rose, *Amorpha fruticosa*, black locust, hispid locust, *Ailanthus*, sumac, hollies, buckthorns, grapes, leather wood, heaths, catalpa, and buttonbrush. On the other hand, the kinds most used run in families, and are:—hickories, willows, oaks, elms, currants and gooseberries, fruit trees and bushes generally, most leguminous trees, prickly ash, maples, dogwoods, ashes, and viburnums.

Generally speaking the trees lost most of the growth of 1904, taking with it, of course, the growth of 1905. We are thankful that there are seventeen years between visitations.

Joliet, Ill.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

ANTIQUITY OF THE CARNATION.—The original carnation, known to history for some 300 years before the Christian era, was a five petalled single bloom, about one inch in diameter, of a pinkish-mauve color. In its original state it grew generally throughout the southern portion of Europe, being found in abundance in Normandy, whence it is believed by some historians to have been introduced into Great Britain. It was described by Theophrastus as early as 300 B. C.—*Horticulture*.

PHOTOGRAPHY WITH PLANT JUICES.—It is pretty generally known that photographs are made by covering a prepared paper with a photographic negative and exposing to light under the action of which certain of the chemicals in the paper are decomposed and the picture results. That the juices of flowers may be used in preparing the paper may be new to many botanists. When Sir John Hirschel was experimenting with photography, more than fifty years ago, he discovered that alcholic solutions of the coloring matter found in the petals of various flowers when evenly brushed upon paper, gave most interesting results. Among the flowers experimented with were iris, violet stocks, poppy, etc. The juices of many flowers did not yield a color like the petals from which they were expressed, but upon the addition of alkalies or acids took on different hues. Thus the oriental poppy

(*Papaver orientale*) gave a faint yellowish stain to paper, but immediately turned to scarlet when a weak acid was applied. A photographic negative placed on paper of this kind and exposed to the sun for some time, caused the color to fade out, but upon the application of acid, the picture came out in vivid scarlet. All this is concerned in some way with the familiar fact that a red geranium may be turned from red to blue and back again by the proper application of acids and alkalies.

PLANT STIMULI.—There are many things that affect the direction of growth in plants. We are most familiar with the response of the plant to gravity seen in the seedling, whose first root invariably travels in the direction of the pull of gravity, while the shoot grows against this force. As in most departments of botany, there are technical terms for the response to each stimulus, and thus we have thermotropism—a turning toward heat; heliotropism—a turning toward the sun; phototropism—a turning toward light; hydrotropism—a turning toward moisture; geotropism—a turning toward the earth, and thigmotropism—a turning caused by contact as in the tendrils of various climbers.

LUMINOUS PLANTS.—The daughter of Linnaeus is credited with the discovery that certain flowers emit rays of light under favorable circumstances, but it is to the flowerless not the flowering plants that we must look for the greatest production of light. Most people are familiar with the curious glow that comes upon decaying wood at times. It is commonly known as fox-fire and was for a long time thought to be produced by the wood itself. Further investigation by German botanists have shown that the luminosity of decaying wood, as well as that of decaying fish and meats, is due to the presence of fungi, principally bacteria, though the underground part of a mushroom (*Agaricus melleus*) also emits

light. The bacteria concerned are usually referred to *Bacterium phosphoreum*, *Photobacterium phosphorescens* and a few others. By lining a glass globe with a material in which these bacteria grow and inoculating it with these plants, Dr. Hans Molisch produced a lamp that would last for two weeks and give light enough for reading coarse print.

BIRDS AS BOTANISTS.—In addition to previous notes in this magazine regarding the tastes of birds for botanical matters, it may be said that the January number of *Nature Notes* mentions several European birds that exhibit an inclination to ornament their nests. A honey buzzard's nest from Sweden was made entirely of green twigs, and the leaves of oak and black poplar; the rough-legged buzzard has been known to ornament its nest with tufts of wood-rush (*Luzula*), and the booted eagle uses pine needles and sprays of white poplar. The trait of decorating the nest seems to be found only in the birds of prey—a group in which one would least expect it.

WILD HYBRIDS.—The mutation theory of De Vries was given publicity just in time to put a quietus on a great deal of erratic species-making. Not so long ago, when a collector found a plant that differed in the least from its fellows, he hastened to describe it as a new species, with a double name in sounding Latin; now-a-days an unusual plant is likely first to start the query whether it may not be either a natural hybrid or a variation of some other plant, one of the so-called "elementary species." This new view is already playing havoc with some of the things that have been passing as good species. In the January *Botanical Gazette*, Dr. D. T. Mac Dougal presents evidence to show that the Bartram oak, known as *Quercus heterophylla* is really a hybrid between *Q. rubra* and *Q. phellos*. The same paper gives a list of more than one hundred other reputed hybrids, belonging to no less than twenty-four plant families. No doubt as botan-

ists gradually turn from the description of new species to a more careful study of the old ones, this list of hybrids will be increased rather than diminished. Contrary to the usual opinion, hybrids are not necessarily, nor even usually sterile.

WOOD-STAINING FUNGI.—Lumbermen and others who have much to do with freshly sawed lumber are familiar with the fact that it is often streaked with various brilliant hues. Usually the lumber takes on these colors after standing for a time in piles. The colors most frequently noticed are brown, black, pink, purple, yellow and blue. A recent investigation of the cause of these colors at the Missouri Botanical Garden brings out the fact that the staining of the wood is due to various microscopic fungi belonging to several genera. In some cases the stain is due to the color of the mycelium of the fungus, and in others to various pigments produced by the plants.

PROTECTIVE COVERINGS OF PLANTS.—The varying degrees of pubescence in plants are most convenient aids to the systematic botanist in distinguishing species, but it is pretty certain that this use is not the principal one for which such out-growths of leaves and stems were designed. Their uses to the plant are to protect from sudden atmospheric changes, to facilitate transpiration, or to aid in controlling it, to shade delicate organs, to ward off dangerous insects, etc. A writer in the *Ohio Naturalist*, states that of about two thousand different species of Ohio plants, only one-fourth were glabrous, that is, without any outgrowths from the epidermis whatsoever. Nearly a thousand plants were found to be covered with some description of downy covering. A few were stellate-pubescent and fifty or more were glandular-pubescent. There were nearly sixty glaucous plants in which leaf or stem bears bloom similar to that which appears on ripe grapes and plums. There were also about fifty scurfy and granular

forms, such as are met with in the pig-weeds (*Chenopodiaceae*). Some few other plants have peltate scales, and others have their leaves dotted with resin or oil.

FLOWERS POLLINATED BY SNAILS.—There are a few plants in the world that are regarded as being adapted to being pollinated by slugs and snails. One would think that such blossoms must be borne by the most deliberate of the plant kingdom for snails are not considered among the hustlers in the insect world. In Malacophilous flowers, as these blossoms are called, the flowers are small, flat and closely assembled so that the snails may easily creep from one to another. In order to keep their voracious pollinators from devouring the blossoms the latter are found to be either poisonous or possessed of a fluid irritating to snails. A few, however, such as *Rhodca Japonica* seem to provide some compensation for the service rendered and produce a fleshy, edible perianth, with which the snails are satisfied.

ORIENTATION OF SOLOMON'S SEAL.—Referring to our recent note on this subject, the British *Gardening World* offers what seems to be a reasonable explanation of the fact that all the stalks of Solomon's seal (*Polygonatum*) bend in practically one direction. Our contemporary suggests that inasmuch as the leaves are arranged on the stem in two rows and it being advantageous to present the upper surface of each to the light, the stems will be found always to bend in such a way as to expose the leaves to the maximum amount of light. Now, the question arises, does this theory fit the facts? We hope our readers will make an investigation of the subject during the coming spring. If this theory is incorrect, the same publication suggests that the bending may be in agreement with the direction of growth in the rootstocks. In this connection it may be observed that the crested fern (*Nephrodium cristatum*) makes many changes in its leaf-

lets to get the right amount of light. The midrib or rachis is nearly erect, but the leaflets are often twisted until their surfaces are parallel with the surface of the earth.

CLEISTOGAMOUS FLOWERS.—There seems to be a variety of reasons for the occurrence of cleistogamous flowers. In the violet family, variations in heat and cold seem to be the main factors, and in the case of the oxalis, whose cleistogamous flowers appear in summer, it has been conjectured that the lack of proper insects to effect pollination is the cause. In the early part of the year the insects visit the chasmogamous, or open flowers of this plant, but later in the year are attracted to other more showy flowers. The sundew affords a still more remarkable cause. It is explained that the leaves have become such expert insect-catchers, that the insects rarely visit the flowers. This seems reasonable enough if applied to the plants in some sections, but most of us know that the sundew is not always cleistogamous. Other causes of cleistogamy in plants are lack of light, and inundation at the blooming season.

FUNCTION OF BUD SCALES.—The average person is inclined to imagine that the scales on the winter buds of trees are for the purpose of keeping out the cold, but upon consideration it is easy to see that this cannot be. In winter we may find the buds frozen stiff. After a variety of experiments, K. M. Wiegand concludes that the principal uses of bud-scales are to protect the young leaves which they enfold from mechanical injury occasioned by the branches being whipped about by the wind, and from the drying out of the moisture they contain. This latter is doubtless the more important, for even in the tropics where leaves are never exposed to cold, the developing organs are often protected by stipules until they can protect themselves. The hair and wool on the leaves of plants are regarded as devices to prevent evaporation and it

is noticed that the young leaves always have the heaviest covering. A woolly young leaf may be entirely smooth at maturity. Dr. Weigand's paper is published in the June number of the *Botanical Gazette*.

PROLIFICATION OF FRUITS.—When Nature makes an abnormal plant or part of a plant, we often see behind the scenes, as it were, and discover a great deal of her methods. This is especially true of the proliferation of fruits, which consists of one or more fruits being borne within another, or from some unusual part of the flower. It has long been held by botanists, that the stamens and carpels of plants are closely related to leaves in their origin, and in these proliferous fruits, we often find buds, flowers, fruits, or other carpels borne in the axils of the normal carpels, just as if the latter were leaves. Occasionally, too, carpels are borne among the ovules within the regular carpels. The peppers (*Capsicum*) are given to this latter method and often bear a smaller fruit inside the usual one.

PROPER DEFINITION OF TUBER.—Ask any botanist to define a tuber and he will reply in substance that a tuber is a short, thickened underground stem, or part of a stem bearing buds, etc., and then you may assure him that the definition is wrong and you can prove your contention by the dictionary. In many books we are informed that the white or Irish potato is a tuber and that the sweet potato is not, the latter being a root, but according to the dictionary both are true tubers. The question then is, shall botanists make the definition for the dictionary, or vice-versa? Examination of the Manuals of Gray, Wood and Britton make plain the fact that botanists regard a tuber as a thickened underground branch, only, but a recent publication of the United States Government (The Propagation of Plants) insists that the sweet potato is a tuber and this is backed up by the books. All this leads to

the further question whether dictionaries or botanical publications are the most desirable mental food for the leading lights in the Government's botanical corps.

A FLOWERING FERN.—According to a bulletin of the Botanical Department of Trinidad, it has long been rumored that in that island there is a fern which, unlike all others, bears true flowers on its fronds. The idea appears to have originated in this way: The common chickweed of the West Indies—*Drymaria cordata*—has deciduous pedicels and these are covered with a sticky substance which causes them to adhere to anything with which they come in contact. When the seeds are ripe the pedicel loosens from the plant, carrying the seed-pod, which looks much like a small flower, with it. This, adhering to the fronds of ferns undoubtedly gave rise to the reported occurrence of flowering ferns.

THE SPECIES-MAKING CRAZE.—It has well been said that the easiest way to secure the repeal of a bad law is to strictly enforce it, and it may be added that the surest way of showing the absurdity of the mania for making new species is to allow the radical botanist to continue unchecked his multiplication of forms. At first, we received the various proposed species of hawthorn with proper attention; now any reference to hawthorns at meetings of botanists is likely to produce only smiles. If, as Dr. Burgess insists, there are eighty-one species of *Aster* where Dr. Gray found but two, the conclusion is forced upon us that the early botanists were but bungling students. The word create means to make something out of nothing. There is a suspicion fast gaining ground that modern botanists are fairly entitled to be called creators. In any event, by pushing the making of species to extremes they have convinced the great body of plant students that the old conception of a species is nearer right than the new one.

EDITORIAL

"The fact that I am renewing my subscription for two years more, shows what I think of the magazine" was the message that accompanied a check for \$1.60 recently, and the number of other renewals received for two years instead of one indicates that many others are of the same mind. Like all other publishers, we make a special rate to subscription agencies, and we have no objection to making the same rate to subscribers when ordering for two years in advance. Send us \$1.60 for two years and save forty cents.

* * *

With the January number, *Muhlenbergia*, edited by A. A. Heller, Los Gatos, California, becomes a monthly publication. It is now in its third volume; the numbers of the first two volumes having been issued as occasion permitted. The editor is a practical printer and knows how to avoid the mortality that affects youthful publications. We have no doubt that this is another magazine destined to grow up, and we are certain that it deserves to do so.

* * *

The article in our January number, entitled "Life History or Natural History" should have been credited to Prof. J. F. Thompson of Richmond, Ind. *School Science* from which we extracted the article gave the credit to the wrong person and we naturally made the same error. The article in question is one that the author need not fear to claim, and we hasten to make amends.

* * *

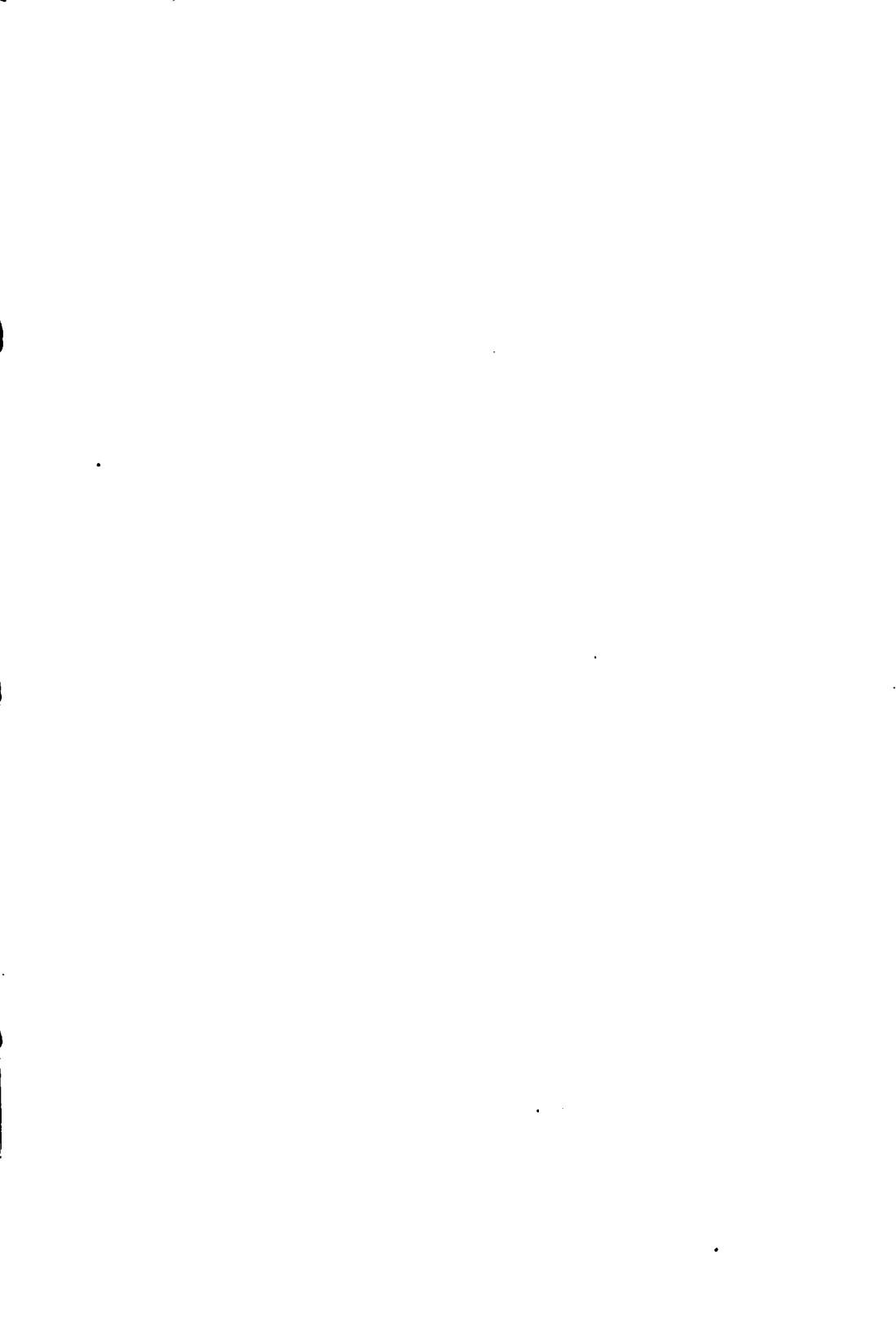
We commonly make a distinction between wild and cultivated plants, but it may be seen upon reflection that every species of plant is wild somewhere. The seedsmen in their

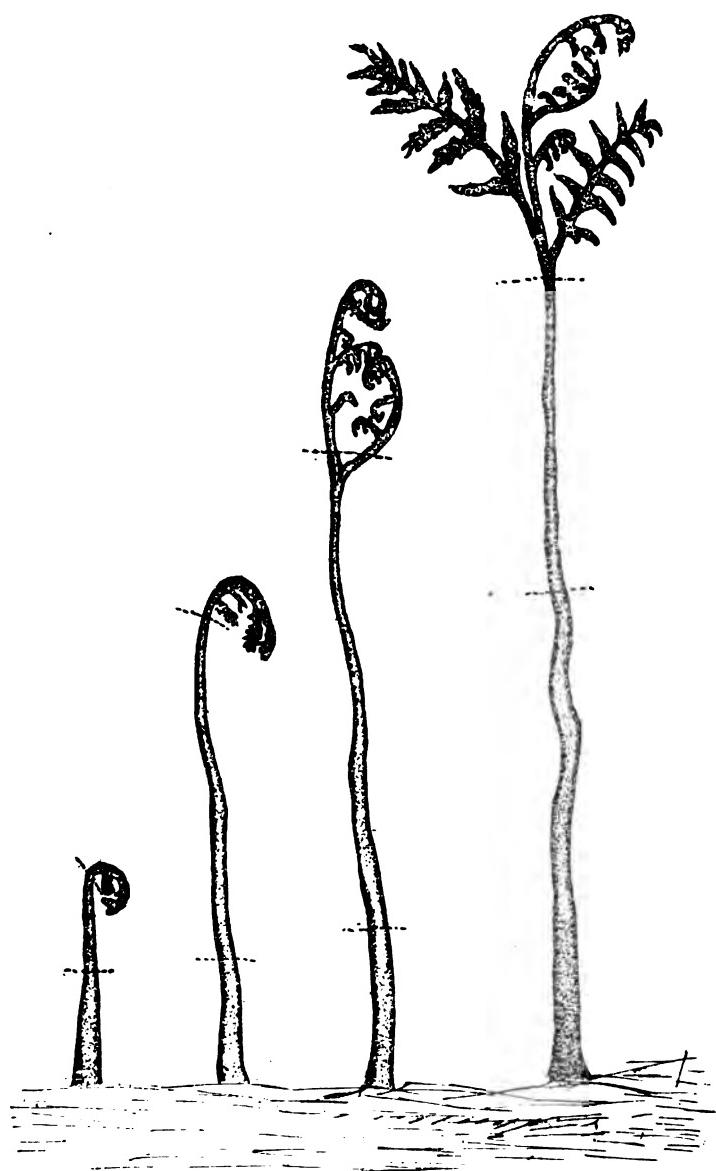
efforts to provide us with worthy additions to our native plants, have searched the whole world over and now we may stay at home and see the plants of South Africa, Japan, Siberia, Australia and other far lands, by the simple process of sowing the seeds in our own grounds. If you are inclined to think that you can recognize the members of the various plant families at sight, sow the seeds of a lot of these foreigners and see how easy it is to be mistaken. There is, however, great pleasure in watching these unfamiliar species slowly coming into bloom and in examining the structure of the flowers as they open. In our advertising pages appear the notices of two firms, who offer the seeds of a large number of these unusual plants, and we suggest that our readers can find an interesting field for experiment next summer in back-yard, botanizing by means of these seeds. Get a catalogue, select the plants with single flowers and Latin names, avoiding the varieties, and add botanical interest as well as beauty to your beds and borders.

* * *

On several occasions we have written in commendation of the excellent series of gardening books, issued by John Lane, London and New York, under the general title of "Handbooks of Practical Gardening." Three new volumes have since come to hand, and it is almost needless to say, maintain the excellent standard of earlier volumes. Especially to be commended is the "Book of the Lily" by W. Goldring, which gives a history of the lily family, full directions for growing and propagating these plants, and what will doubtless be found of most interest to our readers, a description of all species of lily, with an account of the named varieties derived from each. This volume and an earlier one on the Iris, deserve a place in the library of every gardening botanist. The "Book of the Winter Garden" by D. S. Fish gives an account of such plants as bloom during winter in the

milder climate of England, but it also includes all other plants, which, by reason of their fruits, foliage or bark, make the garden attractive in winter. There is an entire chapter on shrubs with colored stems and several on the selection and culture of the leading races of greenhouse plants. The writer appears to be as familiar with American and Japanese shrubs and herbs as he is with those of Europe, and gives to each its proper attention. The hardy species are distinguished from those that are tender and cultural directions for each given, besides much additional matter pertinent to the subject. The "Book of Rarer Vegetables" by George Wythes and Harry Roberts is one that will attract all who desire to give garden or table a touch out of the ordinary. This volume mentions many edible plants that we rarely, if ever hear of, such as coco, good King Henry, oxalis, patience, rocambole, scolymus, rampion, quinoa, sorrel, etc. Directions for both planting and cooking are given. The book will be invaluable to the gardener with an experimental turn of mind. The fact that these are English books, is brought vividly home to us by the frontispiece in the last mentioned volume. It is a photograph of two nubbins of corn labelled corn *cobs*. In the damper climate of England, our common sweet corn is difficult to grow, and even nubbins may well be placed among the rarer vegetables of that country. The price of each volume bound in cloth is \$1.00. Although issued primarily for British readers, the American gardener can find much of value in their pages.





THE COMMON BRAKE AS FOOD.

The portion between the dotted lines is the edible portion.

THE AMERICAN BOTANIST

VOL. XII.

JOLIET, ILL., MARCH, 1907.

No. 2

THE COMMON BRACKEN AS FOOD.

BY ANNA D. DALGITY.

ALMOST everyone knows the common brake or bracken, (*Pteridium aquilinum*), found in woods throughout the greater part of the world. Excepting possibly Australia (a), it is in Western Oregon, Washington and British Columbia, that it reaches its highest development. In this American area it is not only the most common fern, but the largest as well. In the damp woods it grows up through the ever-green shrubbery of salal, Oregon grape, and huckleberry so densely as to make the woods almost impassable. In the drier regions it reaches a height of three to eight feet, and in hollows where the ground is specially rich it reaches a height of fourteen feet. Occasionally there are four or five to the square foot, but when they are so dense as this, they interfere with each other and do not reach the maximum growth. The tallest are in woods where there is shade, for this makes stems and leaf-stalks grow longer. In cleared fields, however, they come up as densely as in woods, but rarely reach a height of over six feet, usually two to four. In new lands they are bad weeds, coming up year after year. The farmer considers them a pest since they are tough and hard to destroy; and the horizontal, subterranean stems, which are an inch or less in diameter, and as much as ten feet long, are hard to cut. The large amount of starch found in the stems produces numerous shoots and is their source of supply during their rapid growth.

(a). Engler and Prantl, Die Naturliche Pflanzenfamilien, Teill,
1 Abteilung 4, s. 49, 1902.

Like all common ferns, (*Filicales*) the leaves of this fern when they appear above ground, are rolled up circinately, like a very much inverted capital J. The food in the subterranean stems causes such rapid growth that in the shade they reach a height of two to four feet before they unroll the leafy portion to any considerable extent. In tenderness and thickness these leafy-shoots are very like asparagus. Tender as these young shoots are, neither horse nor cow will eat them. But the reason for this is evident when one finds the whole leaf-stalk, the younger parts in particular, densely covered with hairs, Fig 1, which are bitter to the taste. From the view point of the fern this is a splendid arrangement, for the large, succulent young shoots would certainly be much eaten by animals if they were not protected in some way.

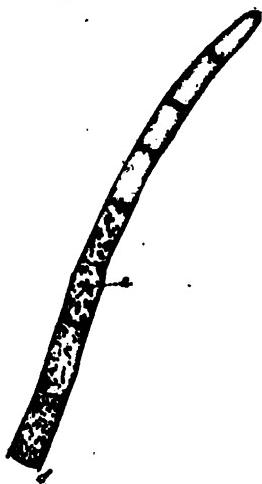


FIG. 1. Hair from shoot of Bracken. S., starch grain

It was conceived that these succulent shoots might be valuable as food, so in the spring of 1906 material was gathered for experimental purposes. The upper portion of the shoots was used, that between the dotted lines in the illustration. It will be observed that the tender part is longest just before the leaf-blade is unrolled. The extreme tips are so rolled up and covered with hairs that it takes too long to clean them, hence they were cut off. The tender part is much longer than that in asparagus, but the bases are woody, as in asparagus, so they were not used. In stalks three feet long as much as one foot is tender. The hairs or scales are loosely attached, and may therefore easily be removed by an ordinary vegetable brush. The stalks were then cooked by various recipes, among which the following proved to be good.

FERNS WITH WHITE SAUCE.

Cut the fern into pieces an inch in length, put them into boiling water and cook for forty minutes. Pour off the water. Make a sauce of milk, thickened with flour and seasoned with butter, pepper, and salt. Pour this over the ferns and serve while warm.

FERNS GREENS.

Place the fern stems in cold water for ten minutes, then cut them up into small pieces and put into boiling water. Cook for forty or fifty minutes. Drain off this water; pour on fresh boiling water and cook for ten minutes longer. Pour off the water; butter, pepper and salt the ferns to suit the taste.

FERN SALAD.

Cook the same as for greens. After the first water has been poured off, put on the following dressing:—

Beat up two eggs; add piece of butter the size of half an egg, a teaspoonful of mustard, a little pepper and salt, and lastly a tea-cup of vinegar. Put all these ingredients into a dish over the fire, and cook like a soft custard.

FERNS ON TOAST.

Cut the stems an even length and put into boiling water, well salted. While they are boiling, cut several slices of bread half an inch thick, pare off the crust, and toast it a delicate brown on both sides. When the stalks of the ferns are tender (usually in thirty or forty minutes) dip the toast quickly into the liquor in which the ferns were boiled, and dish the vegetable upon it. Pour over it white sauce or melted butter.

FERNS WITH EGGS.

Boil a bunch of fern forty minutes; pour off the liquid. Butter, pepper and salt the fern well, and put them into a deep pie-plate. Beat up four eggs, the yolks and whites separately, into a stiff froth. Add two tablespoonfuls or milk or cream, a tablespoonful of warm butter, pepper and salt to taste.

Pour evenly over the fern mixture. Bake eight minutes, or until the eggs are set. Very good.

To test their palatableness, the dishes were prepared in quantity and offered to classes of fifteen to twenty for judgment. Perhaps three-fourths of these pronounced them good. The taste is not exactly like that of anything else, and like tastes in general, cannot be described except in terms of others. However, to many it suggests the almond. The fern cooks up readily, being softer than asparagus; and it has less woody tissue than asparagus as bought in the market, for the wood is not so near the tip as it is in asparagus. The epidermis is, however, somewhat tougher.

In food values, it compares well with other vegetables of the kind, of which some common ones are given in the table below. (b).

Edible portion, Fresh				Carbohy- drates, inc. Fiber	Fiber	Ash	Food Value per lb. in Calories
Green peas.....	74.6	7.0	.5	16.9	1.7	1.0	465
String beans.....	89.2	2.3	.3	7.4	1.9	.8	195
Okra	90.2	1.6	.2	7.4	3.4	.6	175
Cabbage	91.5	1.6	.3	5.6	1.1	1.0	145
Brake (c).....	91.61	1.49	.34	5.32	.5(d)	1.04	141
Radish	91.8	1.3	.1	5.8	.7	1.0	135
Asparagus	94.	1.8	.2	3.3	.8	.7	105
Tomatoes	94.3	.9	.4	3.9	.6	.5	105
Lettuce	94.7	1.2	.3	2.9	.7	.9	90
Celery	94.5	1.1	1	3.3	1.0	85
Cucumbers	95.4	.8	.2	3.1	.7	.5	80

(b). The chemical analyses, except that of the fern, are taken from Atwater, W. O., and Bryant, A. P., *The Chemical Composition of American Food Materials*. U. S. Dept. Agric. Bull. No. 28, Revised Edition, 1899.

(c). For the analysis of the brake I am indebted to Prof. H. K. Benson, of the Department of Chemistry, University of Washington.

(d). An estimate in comparison with that in asparagus.

From the table it may be seen that the brake falls among good foods, its nutritive value being near that of cabbage. In comparison with asparagus, which it most resembles, it proves to be superior, containing .87 as much protein, 1.7 as much fat, and 1.6 as much carbohydrates.

It has been shown that it is a good food, and it has been found palatable by most of those who have tested it. But whether it will become a considerable article of diet or not remains to be seen. The love-apple which was once raised in the flower garden as a plant of beauty is now highly prized as our vegetable, the tomato. Ignorance of tastes habit, and a hesitancy in trying anything new, often prevent one from enjoying some of the best of foods.

The brake was used by the Indians of the Northwest coast before the introduction of wheat flour, but the part used was the subterranean stem. This was dug up, washed, dried, pounded fine, and the coarse shreddy parts removed by sifting. The starchy powder was used as flour. Its use has been discontinued since the introduction of wheat flour. The writer has also been told that the young shoots of the brake are eaten in parts of France.

Commercially it is possible that the brake might be canned and sold like asparagus. Should it become a commercial product, the farmer would no longer need to consider it a pest. The season is short, lasting only about three weeks; but the supply is unlimited, and the product may be had for the collecting.

This investigation was suggested by Dr. T. C. Frye and the work carried out under his direction. To him I wish to express my sincere thanks for assistance and suggestions in carrying out the work.

State University, Seattle, Washington.

SPRING IN STONY PARK.

BY LESTON A. WHEELER.

SPRING came slowly to Stony Park last year; an open winter was followed by a cold and backward spring. The wild flowers were slow to start and those who pushed bravely up were met by cold winds, cloudy days and an occasional snow squall. On April 17th, when I made my first visit to the park, I met with a scant welcome. There were but few things to record except a sort of vague promise for the future. There were a few plants of spring beauty (*Claytonia Caroliniana*) thrusting up their delicate leaves in a sheltered spot beside a rock and a dozen or more stout points were showing where the heal-all (*Habenaria orbiculata* and *H. Hookerii*) had their dwelling. These orchids are in the vanguard of the armies of plants which will later cover the earth with their beatuy. I have known them, when the ground was not frozen, to come up beneath the snow.

Other early plants are the Hepaticas (*H. triloba* and *H. acutiloba*) blood-root (*Sanguinaria Canadensis*) and the yellow daffodil of our grandmother's garden (*Narcissus pseudonarcissus*). None of these are native to the park; a part of the first was sent me by a friend in New York and a part were procured by my sister while teaching in Newfane, Vt. The second I found last year in all its beauty beside a road in Townshend. The last were taken from nearby gardens. All are at home, the last rivaling the natives in earliness.

By the 22nd, I found a few of the dainty pink and white blossoms of spring beauty in a warm place and a few more warm days brought them in their millions. Hepaticas were also in bloom; one root showing beautiful blue flowers; the others were nearly white. A cool week passed before I again had time to visit my wild friends again, and when I did so it was to find the army steadily advancing with many new species in the ranks. *Viola Selkirkii* was blooming in the seam of

a warm ledge. This violet has such large flowers and so many of them as to be all out of proportion to the size of the plant.

Grape hyacinth (*Muscari botryoides*) was formerly grown in a bulb-bed, since abandoned, within the park but was later set in considerable quantities among the rocks and ledges where it is as hardy as a native. Its dainty spikes of white-tipped, blue flowers form a pleasing addition to the native flora. Crocus also is still persisting in the old bulb-bed.

Adders tongue (*Erythronium Americanum*) commenced flowering about this time and the next few days brought out the first flowers of blood-root, yellow violet (*Viola rotundifolia*), Trillium erectum and arbutus (*Epigaea repens*). I have never found the bloodroot growing wild in Jamaica.

The yellow violet was a little late this year as it should come with *Viola Selkirkii*, but it made up for it by being through blooming long before its contemporary had any thought of quitting the field. Although my arbutus has been in its present position for several years it does not thrive. The situation is evidently too warm and dry to suit it. It is considered one of the most difficult of our native plants to domesticate, although I have had more trouble with the twin-flower (*Linnaea borealis*), which I have not succeeded in getting to live for more than one season.

Spring beauty and adder's tongue were soon carpeting the park and nearby woods by the thousands and white violets (*Viola blanda*) were commencing to bloom. One bush of *Lonicera ciliata* was getting well to blooming. This is very abundant in this section, growing on moist banks. On the twelfth I noticed nothing new except the appearance in great numbers of Jacob's ladder (*Oakesia sessilifolia*) and a few blue violets (*V. palmata* var. *cucullata*) in a warm corner. This and *V. blanda* were soon blooming by the million in all parts of the park. Two or three more days brought out the

modest little bluets, innocence or quaker ladies (*Houstonia cerulea*). These dainty plants have been slowly spreading since their introduction into the park several years ago. I have seen them covering acres of moist field as with a fall of tinted snow. A few very warm days saw the finish of the early flowers, but their places were already taken by others.

On the 18th the wild plum (*Prunus Americana* var. *nigra*) growing on a ledge of rock was covered with a fairy cloud of bloom, and a few days later the pin cherry (*P. Pennsylvanica*) was in its full glory. By the 20th, twisted stalk (*Streptopus roseus*) which I set last year, was in bloom; also mitre-wort (*Mitella diphylla*), which my sister procured in Newfane. False mitre-wort, cool-wort or foam flower (*Tiarella cordifolia*) is native to the park and grows in many parts of it. It is much the prettier of the two and blooms about the same time.

On May 28th, *Habenaria Hookerii* began to bloom. It is slightly ahead of time. All the plants are rank and thrifty, five of them with flower stalks. Only one lady's-slipper or moccasin-flower (*Cypripedium acaule*) has bloomed this year, and but two others came up. Their nonappearance is, I think, largely due to what appears to have been a disease which attacked them last fall. The parts above ground of nearly all of my plants turned black and died before the usual time for them to retire for their long winter's rest. I did not like the looks of it at the time but thought perhaps they would come out all right this spring. I did not examine the roots. I had a half dozen that had bloomed for several years and last spring I set eighteen or twenty more. I hoped for great things of them, but was disappointed.

Thus does the spring advance in Stony Park. The flowers in the front ranks have fallen out but their work is not yet done; they have, as it were, retired to private life, perfecting their seeds. Many plants have been introduced,

some for their beauty, others because they were interesting, and still others for the purpose of identification or for specimens. Some of them are extremely difficult to transplant, others act as though nothing had happened. I have never hesitated to take up plants whenever I find them regardless of their period of development. It is necessary to shade some for a few days until they get established. Wood betony (*Pedicularis Canadensis*), which just began to bloom May 31st, is one of the most difficult plants to move successfully that it has ever been my fortune to find.

Somewhat late in the summer, two years ago I found it beside West River, and, it being new to me then, I set a plant in the park. It nearly died and did not recuperate enough to bloom until this year. I tried it again last year and it refused to hold up its head even for a day. Its behavior is very different from what I was led to expect from its appearance.

Jamaica, Vermont.

SOME INCONSPICUOUS FLOWERS.

BY WILLARD N. CLUTE.

ALTHOUGH March is usually cold and stormy, Nature's preparations for the spring go on with few intermissions. The early plants are accustomed to spring from a rain-soaked earth and the first flowers seem not to require much encouragement in the way of warmth. Their is an unbounded confidence in the approach of a milder season all the more striking because not founded upon reason. With few exceptions, the early flowers are not what are popularly called such, but are most of them to be found in the shape of catkins. To the average individual, the notion of a flower is something with showy petals and bright color and he is surprised to learn that viewed from the standpoint of the plant or tree, a flower may lack both these attributes and still perform all necessary functions. Because the forest trees have no conspicuous

blossoms, there are many who suppose they do not bloom at all, and yet, every season, the branches are hung full of flowers and he who will look may be convinced.

In nearly every thicket and fencerow, the hazel is soon blooming. Nature, thus early in the year, begins to fashion the hazelnut, or filbert, as it is called when it gets to market. If the nut's history is traced back far enough it is found that one crop is hardly matured before the plant starts upon another. The catkins are formed in Autumn and every mild day in winter seems to add something to their bulk. It is not, however, until some subtle influence underground touches it, that it begins to grow in earnest. Then the stiff short catkins lengthen and become flexible and sift an immense amount of pollen upon the passing breeze. It is not every plant that can sport two kinds of blossoms; the hazel is one that can. The blossoms in the catkins are all male or pollen flowers. The others must be sought nearby. They appear like tiny crimson stars with five rays, scattered along the branches. In order to form a nut, the pollen must fall upon some of these rays. This is the secret of why so much pollen is produced. There must be enough so that the tiny stars shall not be missed.

Down along the water the alder follows the hazel's example and in the woodlands the birch will soon do likewise. The brownish color in the alder's catkins is used by the children in some sections for dyeing their Easter eggs. A few handfuls of the catkins, boiled with the eggs, suffices to give them a rich brown tint. It often happens, however, that Easter, in following the calendar, and the alder, in following Nature, fail to arrive at the same time. Then the dye industry is wrecked for if the catkins open before Easter, their usefulness for coloring on that day is destroyed.

The hazel and alder are called anemonophilous or wind-fertilized flowers because they trust to the wind to carry their

pollen. The pussy-willow whose silvery catkins now abound along streams and the borders of swamps has found another way of securing the transference of its pollen. It has called the bees to its aid. The two kinds of flowers are on different shrubs, often long distances apart, but by providing a reward of honey, the bees are induced to go from one blossom to another, transferring as they go, though quite unintentionally the pollen which clings to their bodies. Since the willows are pollinated by insects, they do not need to produce as much pollen as the hazel and alder, but they must secrete honey and thus loose in one direction what they gain in another. Wind-pollinated flowers commonly do not produce honey, for the wind asks no pay for his services.

Among honey-producing trees, must be included the red and white maples, now beginning to bloom along suburban streets. These produce both sugar and honey, but commonly not at the same time. When the tree begins honey making, the sugar maker knows it is time for him to stop, else his product will have a bitter flavor and "taste of the bud," as he phrases it. It is probable that most of those who have spent their lives in the country, walking under the blooming maples each spring, have no idea what beauties are swinging from the boughs overhead. Yet from each bud, springs several tiny bell-shaped flowers as marvellously fashioned as any that bloom in softer airs.

One thing noticeable about nearly all the early blossoms is that they are formed during the preceding autumn. In blooming before the leaves put forth they reverse the usual order of things. Indeed, the witch-hazel which properly belongs to this class, goes a step further, and, having formed its flower buds in autumn, blooms then, too, amid the falling leaves and is now ripening its seeds in the damp thickets. The true summer flowers do not appear until the plants have got their leaves, and the scientists have advanced several the-

ories to account for the behavior of the vernal flora, the most plausible of which has reference to the Ice Age, which is also held responsible for the migratory habits of our birds. Whatever the cause, it is certain that without this provision of Nature, our springtime would be dreary indeed, for we should have to wait for the plants to grow up and make enough food for blossoming. And the flowers, cultivated or wild, which now serve to make outdoors lovely almost as soon as the snow has gone, would be missing, and it might be doubted whether the birds would long have courage to sing under such circumstances.

AILANTHUS.

BY DR. W. W. BAILEY.

FEW trees present more points of general interest than the *Ailanthus glandulosus*, the "Tree-of-Heaven," "Gotterbaum" of the Germans or "Vernis de Japan," Japanese varnish, of the French. The last name, Lindley tells us, was probably applied to it through some mistake.

When at its best it is a large and distinctly handsome tree, to which the immensely long pinnate leaves impart a truly tropical appearance. To cause it to assume a symmetrical appearance, its lateral branches should annually be removed, when the upper ones will form a wide canopy. Hence in France, Italy, and in some parts of our country, mostly in greater New York, it has been much employed as a shade tree. It is a rapid grower and with us makes itself perfectly at home. In the Hudson Highlands I have seen it, quite remote from villages, maintaining itself amidst sentinel cedars and other native forest trees as a dense and beautiful copse.

While its leaves are not generally attacked by insects, it is the favorite food of a superb moth—the *Attacus Cynthia*, which, in larva state, infests it. Beautiful as are our *Cecropia*, *Prometheus* and *Luna* moths, they must yield in rich, oriental

beauty to this silk moth of Japan. The colors are a magnificent blending of olive, rose-color, purple and brown.

The leaves are retained till the first autumn frosts, when the leaflets suddenly fall, leaving the stalks for several weeks longer. An objection to the tree has always been the perfectly disgusting animal-like odor of the male flowers,—“redolent,” as Gray says, “of any other odors than those of paradise.” But it is not necessary to plant the staminate tree, and the female in fruit, with its large bunches of ash-like keys, has an added beauty. While, as a rule, these keys are of a yellowish tint, I have seen them near the seashore, at Gloucester, Mass. of a superb scarlet simulating the effect of mountain-ash. Indeed, on one occasion, while at some distance, I mistook it therefore.

The plant spreads vigorously by offshoots as well as by seed, and it has been said of it, that if, by some dire calamity, New York should fall in ruin and for a time be uninhabited, it would in a few years be covered with a forest of *Ailanthus*.

Brown University, Providence, R. I.

EARLY BLOSSOMS.

BY FRANK DOBBIN.

TO WHICH of our native plants shall we give the first place as the earliest bloomer? At first thought one would probably mention the arbutus or possibly the hepatica, but stop a moment; what of the malodorous skunk cabbage that pushes its twisted spathe through the soil some time in March. We bring it home, careful to keep it beyond the reach of our sense of smell, because it is a “blossom.” But even earlier than this, perchance our rambles has led us to some brook already awakened from its winter sleep and we have been surprised and pleased to find the little golden saxifrage in flower. Inconspicuous though it be, here is a herald of spring, as true as the bluebird or the robin.

Spring; what magic there is in the name! Once more we can go afield and watch for the first comers of the floral procession, confident that though the sharp March winds be blowing yet we shall find signs of Nature's awakening on every side. Let us stop and examine yonder clump of alders. For so long have their catkins been swaying in the wintry blast that one could almost doubt if there were indeed any stir of life within. But let us examine them closely today and now for the first time we get a hint of the gold inclosed under that dull outer coat. Now we will pass along to that willow and if the day be warm for the season and the sun bright we may find a few early insects hovering about it, ready to carry the pollen to some waiting pistils.

Did you ever examine on a breezy spring day, a clump of hazel bushes? Of course you noticed at once the swaying grayish catkins, but did you look farther for the little red tips of the fertile flowers? Here is another of our earliest blossoms. I wonder who is botanist enough to tell from these first signs which kind of a nut that particular bush will produce; whether it will be the one having the long hairy beak, or the one having the nut inclosed in a sort of a ruffled affair, called by the text books an involucre!

Now day by day the sun climbs higher and we may expect at almost any time to find in some sunny nook the first hepatica, pushing its downy flower up amid last year's leaves. Some fence corner will perchance contain a few bloodroot blossoms. Ethereal and delicate they are; quite out of keeping with the later rather coarse herbage of the plant.

We are speaking of early blossoms so we must not pass by a plant because it does not appeal to us by some striking characteristic of bud or flower. There is the Pennsylvania sedge, with its yellow tassel of stamens adorning many an otherwise barren spot. On shady banks the birthroot with its down leaves and its curious flower, lying almost, if not quite

on the ground. Crush a bit of the stem or root in the fingers and we have a rich spicy odor, not just like a "breath of Araby" perhaps, but still sufficient to give us a liking for the homely little plant.

What though a few snowflakes fall from time to time it is only a momentary relapse! By these signs we know that spring is here and here to stay.

Shusan, N. Y.

THE PISTACHIO NUT.

ONLY within a short time has the pistachio nut become known in the United States, though it is almost as old as history. The earliest mention of it is in Genesis XLIII:II. The pistachio is the nut mentioned among the list of presents which the children of Israel were commanded to carry down to Joseph to secure the release of their brethren. The list of articles includes myrrh, nuts and almonds. The nuts are the pistachio nuts which are known today.

Some authors give the natural habitat of the pistachio nut as Italy, but that is slightly misleading. The nut is really a native of Syria, where it grows in desert places and where there is almost perpetual drouth. It was greatly prized by all the nations of antiquity, and was one of the dainties of the Greek epicures. Notwithstanding this, it has made its way slowly into other countries and is just coming to be known in the United States.

The nut itself is not as large as a hazel nut, but is rather longer and much thinner, and the shell is covered with a somewhat wrinkled skin.

The tree upon which the nut grows is small, rarely being over twenty feet high, and, as has been said is a native of Syria, and probably Persia.

It is cultivated to some extent in Europe and in Northern Africa. The localities where it will flourish are numerous, and it is not easily killed when once it has been started.

The tree has pinnate leaves, with two pairs of ovate leaflets, and an odd one. The blossoms are borne in racemes. The fruit is ovoid, and about the size of an olive. The nut splits into two halves when ripe. The kernel is of a bright green color and very oleaginous, of a delicate flavor, and with qualities much resembling the sweet almond, though the excellent flavor is more pronounced. The nut is much esteemed wherever grown, but during the days of slow transportation, it was impossible to export them very extensively, owing to their liability to become rancid.

The nuts have frequently been called green almonds, but wholly without reason. They are not almonds, nor are they related to the almond in any way. The oil expressed from them is used for culinary and other purposes.—*American Nut Journal.*

FLOWERS MODIFIED BY INSECTS.—We seldom realize how much that is attractive to us in floral structures, is not primarily due to the flowers themselves, but to insects. Wind-pollinated flowers, as everyone is aware, are not showy and the large number of stamens necessary to produce pollen enough to ensure seed, indicate how wasteful in the matter of pollen this method is. The flowers that have bid for insect visits by the production of color and nectar, have found it quite possible to get along with fewer stamens. But to do this it was necessary to unite calyx and corolla into tubes in order to oblige the insect to enter the flower in the proper position to be dusted with pollen. Thus in response to insect visits the flowers with curiously shaped and brilliantly colored corollas have arisen.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

ARROWHEAD POTATOES.—Many species of arrowhead (*Sagittaria*) form tubers underground in autumn, which carry the plant through the winter or serve to propagate it during the following year. Tubers of this kind have been observed in *Sagittaria latifolia*, *S. graminea*, *S. heterophylla*, *S. longiloba*, *S. papillosa*, and various European species, and may possibly occur in all our species. Some of these tubers are edible, especially those of *S. latifolia*. On the Northwest Coast the tubers were formerly much in demand by the Indians and the Chinese are also said to eat them. These tubers are produced at some distance below the surface of the mud in which the plants grow, and when they germinate, a long rhizome is formed, which develops a corm at its tip from which the new leaves and flower-stalks arise.

LOCATION OF NECTARIES.—Not all nectaries are located in flowers. The nectaries on the rachis of the leaves of the partridge-pea (*Cassia chamaecrista*) and bracken (*Pteris aquilina*) are fairly well known. The almond and peach have nectaries at the base of the petiole, while certain species of touch-me-not (*Impatiens*), have nectaries on the stipules. In flowers, a single set of organs does not have a monopoly of the nectaries. In the basswood (*Tilia*) the sepals produce nectar, in buttercups and their allies the petals perform this office and often these organs are little more than nectaries as in aconite.

The Anther filaments in the beard-tongue (*Petstemon*) take up the work and in the marsh marigold (*Caltha palstris*) the pistils are drawn into service. In the majority of plants, however, it is the receptacle that is the nectar-producer and this often produces special glands or disks in which the nectar is found.

Root-Climbers.—Plants have various ways of getting up in the world. The morning-glory and hop find it expedient to twine, the grape and Boston ivy develop tendrils that are regarded as transformed branches, while the pea climbs by the rachis of its leaf. *Gloriosa superba* climbs by the leaf tip, clematis and nasturtium climb by their petioles, and the green-briar (*Smilax*), by stipules. This does not exhaust the kinds of climbers. There are still the root-climbers, such as the poison ivy and trumpet creeper (*Bignonia*) that produce aerial rootlets which firmly attach them to their supports. It is believed by many that the contact of the vine with its support is quite sufficient to cause these roots to develop and in general this seems true, but anyone who has seen an old stem of poison ivy must have noticed that the rootlets have certainly not all arisen in response to this stimulus for they spring from all parts of the stem.

ORIGIN OF PETALS.—Relying upon the resemblance between leaf-buds and flower-buds, botanists have often asserted that the floral organs have been derived from leaves. While it is doubtless true that "a flower is a transformed branch," the exact order in which these parts have been transformed or, rather, the order in which each part appeared is often misunderstood or lost sight of. It is very certain that there were pistils and stamens long before there were flowers in any common usage of this term. Pollen grains and certain structures in the ovules of plants are simply spores comparable in all respects to the spores that appear in the spore-cases on the

back of fern leaves or in the cone-like spikes of the horse-tail or Club-moss. These spores seem to be essential to the continuation of the species, so essential, in fact that they appear in the lower orders of plant life long before true leaves of any kind were evolved. Thus carpels and stamens may be the homologues of leaves, but they have apparently never been derived from these structures. When and why petals and sepals arose and whether they were derived directly from leaves or in a roundabout way from stamens and carpels is quite another question. Both views have their adherents, and it is quite possible that in some plants these organs have been derived from leaves and in others from stamens.

FUNGUS COLORING.—Recent mention has been made in these pages of the various colors due to fungus growths within wood. One color which has probably been noticed by many is due to the green cup fungus, (*Chlorosplenium Aeruginosum*). Most commonly seen in the old branches of oak on the ground, the partly decayed wood assumes a beautiful verdigris green. The fungus grows mostly in the spring, but may be seen most any time of the year. The mycelium or root of the fungus, penetrates in microscopic threads, the cells of the wood, producing the color. The wood so colored either by natural methods or by artificial infection, (Minn. Bot. Survey V. 5, p. 267) has been used to some extent in making veneers employed in the manufacture of Tunbridge ware. The coloring matter can also be extracted from the wood and used for other purposes. The fruit cups of the fungus are not common, but may be found occasionally, not larger than small peas, shaped like an ordinary toadstool, and of the same beautiful green color as the infected host on which it grows.—*Stafford C. Edwards, New Brighton, N. Y.*

VARIATIONS IN THE TOAD-FLAX.—In examining the *Linaria vulgaris* Mill, with a class in botany, I found the following remarkable and interesting varia-

tions in the corolla. The variations were all found on the same plant. In two of the corollas the spur was absent as was also the usual orange colored palate. The corolla in both of these flowers consisted of five petals, but in one of them there were four petals in the upper lip and one in the lower while in the other flower all five petals were in the position usually occupied by the upper lip. The corolla of a third flower was tubular, about-three fourths of an inch long, of greatest diameter at the base and tapering towards the apex. At the base of this peculiarly formed corolla were three spurs separated from one another by about one third of the circumference of the tube. The apex of the corolla was surmounted by an enlarged crown, circular in form, and orange colored like the palate in the ordinary flower. At the upper end of the tubular corolla just below the orange colored crown were three petal-like tips equidistant from one another.—*J. B. Turner, Hamilton, Ontario.*

PLUR-ANNUALS.—Climate and the varying hardiness of plants has made it possible to divide vegetation into several distinct groups depending upon their length of life. The annuals last but a single season and the biennials store up food the first season and flower and die the next. The perennials, on the other hand, may live for many years and commonly do not flower until one or more years old. There are also variations of these groups. A winter annual is one whose seeds being sown in autumn, germinate and last through the winter to flower and fruit the following spring and then to die. These plants show that annual plants are not all due to the cold. Monocarpic plants are in a sense related to the biennials. They have the nature of biennials, but store up food for more than one season before the supreme effort of flowering. A good illustration is the century plant which does not take a century for food storing as so many people believe. The term plur-annual is rarest of all, though ex-

amples of this class are familiar to all. A plur-annual may be defined as a plant that ordinarily lives more than one season, but which, owing to being transplanted to a region in which it cannot live for part of the year becomes to all intents and purposes an annual. The tomato, castor-bean, red pepper, cotton and many other garden plants are plur-annuals.

MATERIALS FOR SMOKING.—Those who must smoke are not, and apparently never have been, restricted to tobacco. Tobacco is still the principal substance used for smoking and following it comes opium and hashish, the first made, as most are aware from the juice of the poppy and the second from the gum of the hemp. We might call these three the recognized substances for smoking, but many others exist. Many are known to the small boy, such as the pods of the catalpa, mullein leaves, bamboo, cornsilk and cabbage leaves, the latter reputed to be indulged in unintentionally by children of larger growth, when mixed with, their prized Havanas. Possibly it is because the American Indian is more childlike in some things than his white brother, that he mixed a variety of other things with his smoking tobacco. Among these may be mentioned the bark of wahoo (*Euonymus*), red osier (*Cornus stolonifera*), sumac, (*Rhus trilobata* and *R. glabra*), silky cornel (*Cornus sericea*), arrow-wood (*Viburnum*), black willow (*Salix nigra*), mountain laurel (*Kalmia*) and ironwood (*Carpinus*). The leaves and bark of the squaw huckleberry (*Vaccinium stamineum*) was also occasionally used. Several of these things were commonly used under the name of Kin-nikinick and this name has persisted to the present as one of the names of silky cornel.

EDITORIAL

Never before in the history of this magazine have we had so many subscribers upon our books, and never have we had fewer unpaid accounts. This speaks volumes for the interest that is taken in our kind of botany. At the outset there were many who doubted our ability to get support for a publication devoted chiefly to economic and ecological botany, but we are proving that they were mistaken. If we can now add at least two hundred more names to our list, we will at once increase the size of this magazine by adding eight pages to each issue. Is this not worth working for? Speak to your botanizing friends about it. Every new subscriber increases the value of the magazine to you. And while we are about it, we would like to get those remaining unpaid accounts closed up and therefore enclose a bill in this number for all whose accounts are a year or more in arrears. It will not cost our subscribers much of an effort to square up accounts, for the sums due are all small. It may be well, too, to remember our offer of twelve volumes for \$5.00.

* * *

In a single day's mail this month, we received three orders for sets of the first four volumes of our magazine, *The Fern Bulletin*. These volumes have long been out of print, and of course we could not fill the orders, but this shows how the demand for the early numbers of a good magazine continues. Nearly fifteen years after publication, these numbers are in greater demand, and command a higher price than when first issued. A similar state of affairs is going to exist, some day, regarding THE AMERICAN BOTANIST. The supply is not inexhaustible. Our urgent invitation for all who can, to get a full set, is not made entirely because we desire to sell the magazine. Of course, we expect

to benefit by such sales, but if a single purchaser thinks that he is not also benefited, he may have his money back upon the prompt return of the numbers. In this connection, we wish also to announce a new special offer as follows: We will send the first ten volumes for \$5.00 and make the purchaser a present of a year's subscription. If you have some of the volumes, we will send you any ten volumes you may care to order and will add the year's subscription. You may order the next ten volumes to be issued if you wish, the gist of the matter being that twelve volumes may now be had for five dollars, and we do not care what volumes they are. Any person in arrears for subscriptions, may take advantage of this offer to pay up, but this part of the offer is subject to withdrawal without notice.

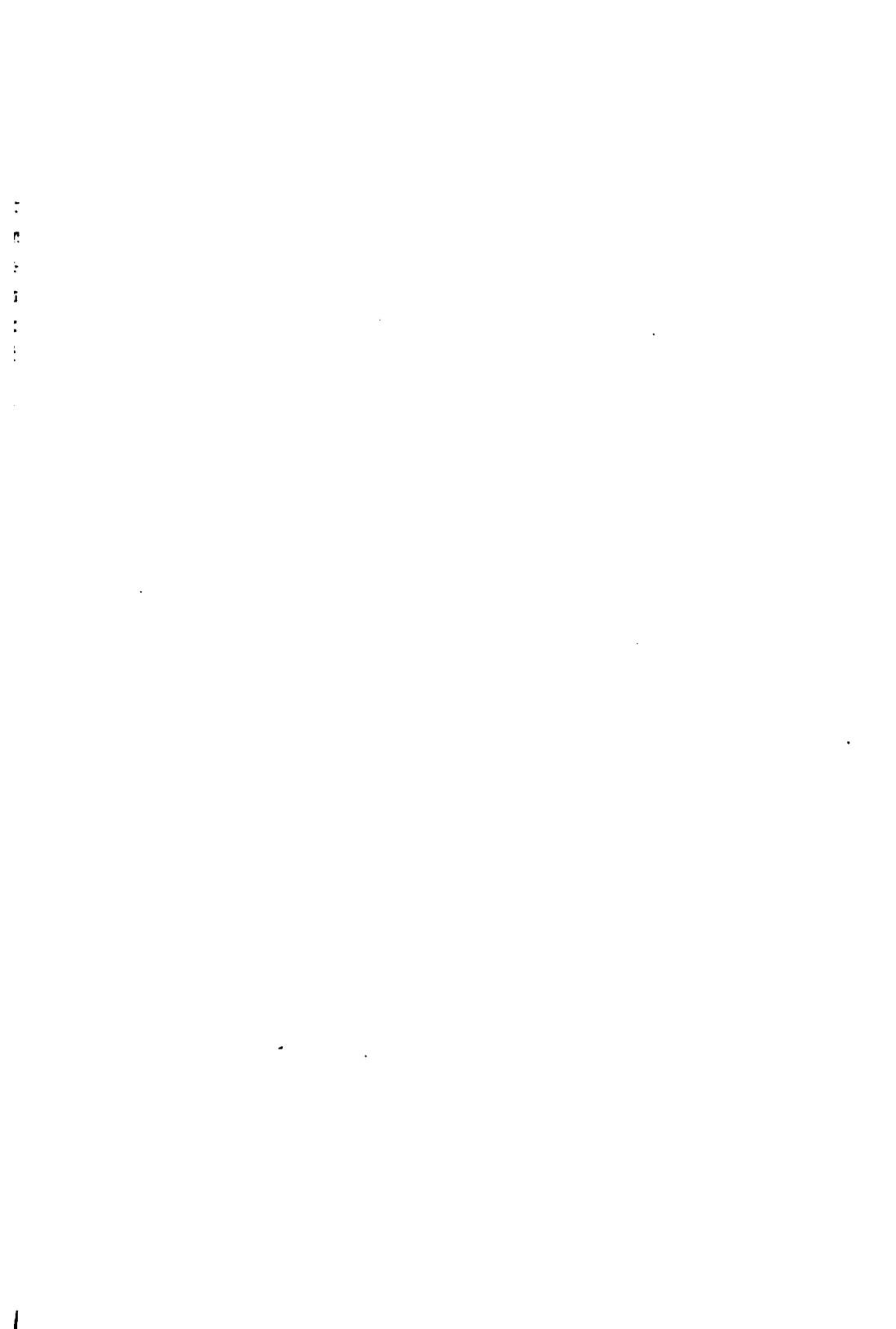
BOOKS AND WRITERS.

The Plant World, profiting by a good example, has decided to go west and hereafter will be issued from Denver, Colo. Like this same good example it will also be issued on the fifteenth of each month.

This is the season when garden books are in greatest demand. In most sections it is a bit too early to proceed to actual garden-making, but it is not a bit too soon to get the garden plans under way. It may be said at the outset that books are not half so valuable to the beginner as a single season of actual experiences, yet books are not to be disdained even by the gardener who no longer considers himself a novice. There are hints and ideas to be gained from almost any book. Two helpful new books of this kind have appeared in time for use during the present season's planning. The first is from the press of Charles Scribner's Sons and is entitled "The seasons in a Flower-Garden," by Louise Shelton. After some preliminary chapters on soils and planting the book plunges into the season in September when the good gardener really

begins the making of next year's garden. There are seeds to be saved, plants to be moved and notes taken as to the more desirable things to be planted another season. The book follows the seasons from September with timely hints as to work to be done, the best flowers to plant, how to combat the insect enemies, etc. The book costs a dollar and ought to be worth that to any amateur.

A more pretentious book is "Common Sense Gardens" by Cornelius V. V. Sewell from the Grafton Press, New York. This not only discusses gardening matters, but devotes considerable space to garden furniture, walls, fences and the like. It is not, however, a book of directions for garden making, but appears more the opinions of an amateur who had tried many plants and speaks from experience as to their cultivation. Apparently influenced by the reading of English books the author evinces an overweening fondness for box as an edging and hedge plant. Not enough attention seems to have been paid to the necessity for choosing different plants for different climates and our native perennials get off with scant notice. The book is worth owning, however, if only for the most excellent illustrations, one hundred in number, principally reproduced from photographs. These show scenes from many famous American gardens, as well as walls, specimen trees, etc. The book will be of greatest usefulness in the region of country about New York and Washington. It contains nearly four hundred pages and costs \$2.00 net.





SOLOMON'S SEAL.—*Polygonatum biflorum*.

a. Rootstock
b. Perianth opened.

THE AMERICAN BOTANIST

VOL. XII.

JOLIET, ILL., APRIL, 1907.

No. 3

SOLOMON'S SEAL.

BY DR. W. W. BAILEY.

A number of distinct plants, but all of the Lily family, are popularly known as Solomon's Seals. The confusion results from a common resemblance to each other in habit and leafage. It is, however, only the species of the genus *Polygonatum* to which the name properly applies.

In these an elongated rootstock, more or less thickened, is observed, marked at intervals by a circular scar denoting where former ascending and leaf-bearing stems have stood. These, as they fall, leave behind them this record of their being. The scars bear a certain resemblance to a seal stamped in wax, hence the name; and as in tradition and fairy tale, a potent seal is attributed to King Solomon, this stamp is considered his.

It will be recalled by lovers of the Arabian Nights that Solomon's seal was enough, so long as it remained unbroken, to confine the tremendous genie, who gave the fishermen so bad a quarter of an hour. In our plants we observe that the much married king, possessed seals of various sizes. Some were official, no doubt; others reserved for his less serious, but frequent correspondence. *Polygonatum giganteum* is his Great Seal of State. So far, we have found it powerful enough to ward off Blue Devils if not more potent demons.

This larger species, from two to seven feet high, is cylindrical and smooth, usually somewhat recurved, giving it a very graceful habit. The alternate leaves, three to eight inches long, are ovate and partly clasping, the upper ones oblong and sessile. All have prominent nerves, an entire margin, and are more or less glaucous. In the axils of the

leaves, and gradually diminishing in size are found the cylindrical, oblong flowers, the creamy white perianth having its six lobes beautifully tinted with apple green. Included are six stamens, and with introrse anthers. The superior ovary is three-celled, with several ovules in each cell, and there is a slender, deciduous style. The capitate stigma is obscurely three-lobed. The resultant berry is globular and black or blue in color. The pendulous peduncles bear from two to eight flowers, the pedicels uniting below into a common peduncle.

This plant is showy enough to be introduced into any garden, and in cultivation increases in size and vigor, soon spreading to an alarming extent. It is hence desirable to give it a bed to itself, or to plant it well back of other things which it will not over-shade. The name *Polygonatum* is from the Greek *polus*, many and *gonu*, a knee, "alluding to the numerous joints of the rootstock and stem."

Our other species, *Polygonatum biflorum*, is very much smaller from one to three feet high, and as its name implies, usually has two flowers to a peduncle, sometimes only one; occasionally as many as three. The flowers are greenish and of no great beauty. While in *P. giganteum* the filaments are smooth and naked, in this species they are papillose-roughened. The leaves are more decidedly glaucous. Here in Rhode Island, it is our only species and is very common. It has a wide distribution according to Gray's Manual, from New Brunswick to Florida, and west to Minnesota, East Kansas and Texas.

The False Solomon's Seals belong generally to the genera *Smilacina* and *Maianthemum*, and we have even heard *Streptopus* and *Uvularia* so classed. There is, one would think, no likelihood of mistaking any of these for Solomon's Seal, yet in Rhode Island, the dainty little *Maianthemum* is almost universally so entitled. It will be recalled that

this pretty plant, which in the writer's earlier days was called a *Smilacina*, has a terminal recene of small white flowers. Under ground it produces yards of a delicate rootstock which required the patience of Walter Deane to wholly unearth, press and mount. This certainly bears no obvious seals.

The *Smilacinas* of which, here in Rhode Island, we have two species, *S. racemosa* and *S. stellata* resemble the last, but on a much larger scale, while *Streptopus* and *Uvularia* are so conspicuously different except in foliage, it would seem impossible that any one should confuse them. The writer's experience is, however, that when people, botanists or other, make up their minds to call anything by a particular name, even the authoritative seal of Solomon himself appended, will not shake their belief.

Brown University, Providence, R. I.

SOME WOOD-DESTROYING FUNGI.

BY L. AUGUSTUS HAUSMAN.

FUNGI are veritably and unmistakably plants; of a low order, it is true, but still, plants, developed from seeds or germs slightly analogous to, but not wholly homologous with the seeds of higher orders. Besides the larger species there exist forms so minute that their structural pesuliarities are discernable only with the highest powers of the microscope. Of these the mildew, blue-mold and gory-dew may be cited as familiar examples.

While fungi attack and destroy much dead wood, they also often attack living trees and cause their downfall. When the spawn of the fungus strikes a substance which is conducive to its growth, the protoplasm or living matter of the cells send forth its vital juice which penetrates the substance and decomposition speedily follows through the rapid growth of the mycelium, the vegetative portion of the fungus. By breaking open old stumps where these plants are growing the

mycelium may be traced throughout all their decaying parts. It is composed of countless numbers of fine hair-like processes with tiny outlets which take up such material as is conducive to the growth of the fungus.

In order to grow the fungus must have a large per cent of moisture, and often, after a rainy spell, one may find such growths on stumps and fence rails in high, dry places, where before it gave no evidence of its existence. The mycelium was there, however, but in a dormant state until the rain nourished it into action.

The genus, which perhaps is represented by the most species of wood destroying fungi, is the *Polyporus*. A few of this genus are reported as edible but the greater number are too corky and tough, when mature, to be fit for food. In the species of this genus the tubes are not separable from each other. One of the most common is *Polyporus hirsutus*, so called from the numerous short stiff hairs which cover the cap, and give it a velvety appearance. It occurs most abundantly on wood of fallen trees but in some cases I have found it on standing trees also. It is usually a sessile species but one may often find it in umbilicate form when it is supported by a short central stem. The cap is grayish or brown, often zoned with lighter or darker shades. The fruiting surface is at first yellowish, then brown, but exceptions to this rule are frequently met with for I have found plants, comparatively young, whose under surface was as dark colored as many of the older ones. The tubes are very regular in arrangement and may be seen very readily with the aid of a pocket lens. In fact it adds greatly to the interest of the observer if he possesses a good lens, as it brings to light many hidden and interesting facts. A damp wood makes an excellent place for the growth of this fungus, especially after a rainy spell, when hundreds of young plants may be found on old brush heaps and dead branches. It is not found to any great extent in high dry woods.

A second species perhaps the most noticeable of all the polypori is *Polyporus betulinus*, or birch polyporus, so-called from its habitat, invariably on the birch. I have heard it called the "hoof-fungus" also, but this name seems to be most applied to *Fomes fomentarius*. *P. betulinus* grows in a hoof shape from both living and dead birches and often attains very large dimensions. Often the cap is evident before the fruiting surface. In the ordinary plant the cap is white; spongy when wet, but when dried it presents a hard, tough surface which is often utilized in the manufacture of razor straps. The under surface is a deep brown. Under the microscope, the cap is seen to consist of multitudes of fine hairs somewhat analogous to the hairs of the mycelium. In fact, any portion of the woody fungi, when submitted to microscopical examinations is found to consist of hairs. As the mycelium itself is composed entirely of fine hairs there can be no doubt but that those which go to make up the fungus proper are merely processes of the same.

In the genus *Lenzites* the spores, instead of being developed in tiny perforations, are borne on the sides of the gills which radiate from that side of the plant which is attached to the wood. Although, in the following species the caps vary greatly in color, the plants may be at once identified by the hymenium which never has any radical change. *Lenzites separia* is perhaps the more common of the two, and may be at once recognized by the brown papery gills. In my collection of this species I have plants whose caps shade from almost pure white to dark reddish brown, well illustrating its changeableness. The average plant however is a deep brown, both above and beneath and the cap is often zoned with darker shades. It is a sessile species, often gregarious and sometimes imbricate. Low, damp woods and high, dry woods are alike conducive to the growth of this plant. It is a pretty and graceful species and thrives under the most adverse circumstances.

Damp woods and swamps seem best suited to *Lenzites betulinus*. Of course the rule is not inflexible and one may often come upon specimens growing where he least expected to find them. For the most part, however, different species have different localities which seems best suited for their development and for this reason I am safe in ascribing these different localities to these fungi.

Lenzites betulinus is even more remarkable for the variation in the color of the cap than the preceding species. While the cap is usually gray zoned slightly, and the gills are yellow, there are many variations. In my collection I have plants whose caps are white, grayish brown, and in one instance gray with red zones. These changes are due, doubtless to differences in the organic matter which they take up. Young plants are soft and yielding but old plants are firm, though somewhat spongy. The pileus in old plants is often tinted green, due to the growth of algae.

The plants in the genus *Fomes* were formerly classed with the genus *Polyporus*, but modern mycologists prefer to classify them in this group. *Fomes fomentarius* is the most common representative of this genus and is found in both dry and damp wood on logs and stumps. The cap is dark brown, usually with darker zones and the hymenium is the same. The mouths of the fruiting tubes are large and irregular and may be readily seen by the naked eye.

The peculiar shape of the tubes distinguish this species from all others. I have found the largest and most flourishing plants growing in damp woods, particularly besides brooks where the running water keeps the wood on which they grew wet continually, thus affording the plants sufficient moisture to enable them to attain large dimensions. The caps of plants found growing in dry places are lighter in color and more corrugated than the caps of those found growing in damp places. As a rule, the plants grow in single, sessile growths, but in

1903 I took a specimen with two distinct caps. This plant is often called "German tinder" and it is said that it is used largely by the Germans for making fuses. This is done by removing the tube system and beating the fungus until flexible, and then dipping it into saltpetre. In Bohemia they are said to be utilized as flower pots by cutting out the tube system, inverting the plant and filling the hollow portion with earth.

The most beautiful species of this genus is *Fomes lucidus*, so-called from the shining cap which presents a beautiful surface, appearing as if varnished. The color of the whole plant is yellowish then chestnut red. In mature plants the tubes are brown. The surface is quite woody and tough when the plant has matured. Dry stumps are usually the habitat of this plant and it is seldom found in any but comparatively dry places. This beautiful fungus succumbs so quickly to the attack of certain insects which are fond of fungi, that it is difficult to find a mature plant in a perfect state of preservation.

Fomes applanatus has a hard, woody shell, much harder than that of *Fomes lucidus*, in fact it is the hardest of these fungi. The cap is brownish or gray, sometimes white; corrugated, and strongly zoned with annual rings for this plant is perennial. The surface of the tubes is white and the mouths are scarcely visible to the naked eye. Bruises of the tubes turn brown and for this reason it is often collected and drawn upon with a sharp instrument. The plants usually are sessile and single and grow on logs or stumps alike in wet or dry places. It is the longest lived of any of the fungi, for the reason that, being so hard it neither decomposes from an over abundance of moisture, or succumbs to the ravages of insects which attack and destroy so many of the softer species. At certain seasons of the year the cap is covered by a reddish, powdery substance due "to the numerous spores or conidia which are developed on the upper surface of the plant in addition to the smaller spores developed in the tubes on the under surface." (Atkinson.).

These conidia are somewhat analogous to the spores of *Dae-dalea quercina*.

The genus *Favolus* has but one representative which is native to our woods; the *Favolus Areolarius*, which occurs on dead twigs, particularly hickory. The tubes are large at first, hexagonal in form and radiate from the stem. The stem is either lateral or absent though in most cases it is difficult to judge whether or not the tubes radiate from the center of the stem or from some other point. The cap is white, often with tiny markings of black. The periphery is sometimes involute. The plants are thin and pliant when fresh, but when fully matured they are hard and coriaceous. They never attain large dimensions. Dry twigs seem to be the usual habitat.

So ends the list. I have not mentioned one-half of the species in this large group, which are common to our woods. This branch of nature has been least developed of them all, and although of late years, the compound microscope has done much toward enlightening us in some points, the life-history of the majority of species has still to be disclosed and the prospects of new discoveries for those who persevere in this neglected study, are great.

SOME SPRING FLOWERS.

BY WILLARD N. CLUTE.

EARLY in the year, the season is always a little in advance of the observer, no matter how keen his perceptions. When spring has fairly begun everything develops so rapidly that none can exactly keep pace with it. In time there comes a lull—a distinct period when spring flowers give place to those of summer—but at present it is not the making of flowers we are viewing but merely their unfolding. Nature has been preparing for this longer than we imagine. Six months or more ago the flowers were formed and the food for their nourishment stored up in compact parcels underground so that there

should be no delay when the time came. It needs but a certain number of sunbeams to set them free.

In the procession of the flowers each has its appointed place. The date upon which it blooms may vary, but it is pretty constant as regards its place with regard to the others. We may predict with some confidence the time when any species will be at the height of its flowering season, but the first of their race, the heralds of the coming army, spring up before we are aware of it. Some sheltered nook which gives a slight advantage in the way of moisture and sunshine may contain a little colony in full bloom some time before their less favored kin appear. It is the search for these firstlings that gives so much zest to our spring rambles.

Among spring flowers, there are always a few that lead the rest in popularity. The Dutchman's breeches is one of these. The flowers are rather choice as to location and are valued accordingly, but they are constantly becoming rarer under the treatment they are subjected to each spring. Their favorite dwelling place is on the ledges of shaded rocks, or in rich woodland soil. One cannot fail to note how decorative the handsome foliage and slender racemes of waxy white blossoms appear against a background of gray rock. The plant is a relative of the cultivated bleeding heart and closely resembles it except that the two petals are prolonged into spurs at base. Each raceme of flowers looks not unlike several pairs of tiny breeches hung on a line and thus the plant gets its common name. Were the brownies as well known when plant names were given as they are now, it is likely that the flowers would have received another name. The breeches look as if they might easily fit those rotund little sprites.

The bloodroot flourishes in thickets along streams but in many places is rare or entirely absent. It is always an object of interest to the young people who dig up the thick rootstocks and break them to see them bleed. It is apparently good red

blood that flows from the wounds, not a weak looking fluid in which a vivid imagination is required to see any resemblance to blood. It is said that the Indians once used this juice as a part of their war paint. Makers of cough medicines have also found a use for it. The bloodroot is a member of the poppy family all the members of which are characterized by a thick colored juice. In the poppy this juice is white; in the common celandine it is yellow. Although the juice of the bloodroot is red it bears a pure white flower of wax-like texture. Before blooming it is wrapped up in the only leaf the plant possesses.

The yellow bell-shaped flowers of the adder's tongue are attractive enough of themselves to command our attention, but the plants have a singular trait in the behavior of their bulbs which make them doubly interesting. The plants are usually very abundant in wet places, their brown-blotted leaves marking every hollow in the woods. All who have attempted to dig up the plant in flower, know that it springs from a compact bulb at a considerable depth in the earth, often a foot or more. How this bulb got so deep in the soil was long a mystery for it was known that the seed falling on the earth produces only small bulbs near the surface. In such positions they do not bloom. For some unknown reason they must be deeply buried to flower. Certain other plants have thick roots that after getting firmly established contract and pull the plant into the earth, but the adder's tongue has a unique way of its own which consists in developing long runners which worm their way into the soil. These might be described as a sort of portable bulb, for before the summer ends, each has formed a new bulb at its tip, and the parent bulb has withered away. If the runner has gone deep enough, all is well, but if not, the plant has to try again another season. The cunning of the plant, however, has fallen a little short of its object for the runners sometimes come to the surface and spread out laterally instead of descending and it may be several years before the plant, with which

we cannot fail to sympathize, is able to bloom. But it has some gain for its losses. Commonly it has more than one runner which not only multiplies its chances of success, but multiplies the species as well, so that what started at the surface as a single bulb may be several when it blooms. When the bulbs have reached a proper depth, they stop sending out runners, and devote their energies to producing blossoms. The plant is called yellow lily in some sections, and John Burroughs has proposed for it the name of fawn lily, in allusion to its spotted leaves.

The rapidity with which the early flowers spring up everywhere is remarkable, but no less so than their equally rapid disappearance a few weeks or months later. Before mid-summer all traces of many of them will have vanished, and the others will be overshadowed by summer flowers. Yet somewhere in the earth, the spring flowers will be almost prepared for a new spring. When the cold autumn mornings and bright days take the semblance of another vernal season they are occasionally beguiled to put forth. More than thirty different species of spring flowers have been known to bloom thus in autumn.

SAGE BRUSH AND CACTUS.

BY EARL LYND JOHNSTON.

“SAGE Brush and Cactus!” I well remember as a school-boy of reading in the geographies of these plants as the “characteristic vegetation” of the western portion of our country known as the Great Plains. At that time I had little or no conception as to what that really meant. The cactus I knew well and often wondered if the sage brush was as repulsive in appearance and at the same time pitying and wondering how the people managed to live “out west.” However much I felt for these people I was soon to learn that they little needed my sympathy.

I caught my first glimpse of the prairie and prairie plant life on a Christmas day a few years ago. As I crossed the

eastern portion of this stretch of semi-arid country I saw many things to arrest my attention. It was a wonderful sight to me —the barrenness of this region covered extensively at this time with the leafless perennial stalks of the sage brush (*Artemisia*). It seemed to have taken up a homestead on every portion of the land; for every direction one may look he sees it in great numbers. Although growing very abundantly and densely covering the ground each plant seemed to preserve its individuality to such an extent that as far as eye could reach we were able to pick out, as the train rushed on, individual specimens and the approximate space covered by each.

If the sight of the sage brush in winter was one to interest a person how much more did it the next summer. Eagerly I watched it from the time it put forth its first leaves in February until it ripened its seeds late in the fall. As it begins to get somewhat green it becomes a conspicuous plant at all elevations. I have seen it from the dry plains to the desolate regions far up in the Rockies. I well remember finding hid among the alpine rocks, as though doubtful as to the propriety of peeping forth, the diminutive species. *A. scopulorum*. At this elevation (13,000 feet) it was abundant and partook of the characters of the sub-artic flora found there. All the specimens I secured were less than six inches long contrasting greatly to the plant of the plains which is generally two feet or more tall and branching sufficiently to cover several square feet of ground.

The general impression the sage brush makes on one is resolved into a pleasant study as acquaintance proceeds. As with other plants its adaptations for its existence amid its surroundings is a cause for thoughtful study. We are often led to wonder how this plant thrives where others succumb; in fact how it manages to live where many others die. If we are observing we can easily find out. It secures and conserves its water supply by a long, thick, woody and somewhat branching

root varying from three to six inches in thickness and descending to a depth of from four to nine feet.

Those not accustomed to desert life and the way plants manage to exist on an arid plain and in an arid atmosphere would certainly be surprised at the immense roots some of these especially adapted plants have. The sage brush can hardly be said to represent even an average in the matter of root development; for many plants as the "soap weed" (*Yucca*) and the bush morning glory (*Ipomea*) have truly enormous roots. This plant is also provided with very rudimentary leaves and a corky layer of bark encasing the root as well as the stem above ground. These modifications give little chance for transpiration to take place. Thus it circumvents all attempts of the thirsty sun to steal the life-moisture so hard to secure from an apparently moistureless soil.

Again we find that this plant has a bitter acrid taste from which it derives the name wormwood. Animals are forewarned of this taste by the peculiar aromatic odor the plant possesses, which thus protecting itself from the attacks of herbivorous animals. In time when the ground is covered to the depth of several inches with snow when other articles of food are scarce it is eaten regardless of taste and has been reported to cause the death of domestic animals. We find in this plant certain medicinal qualities which are supposed to give it value as a tonic for numerous ailments. Like others of the wild things of nature it tends to recede as civilization advances for one never finds it in cultivated ground.

The genus to which this plant belongs is very interesting botanically as thirty-nine species are reported from Colorado alone. The variations which are now considered of sufficient importance to give specific rank are many and quite difficult to make out.

One who has never seen the sage brush should have (if this description is graphic enough) the following mental picture: It is a plant covering large areas of the plains very thick-

ly although not massed closely together. At a distance it appears globular in form resembling the tumble weeds in this particular. A closer examination reveals a plant about two feet high on an average with a root all out of proportion to its size. Numerous slender stems spring from the crown. These stems branch somewhat and are covered with patches of very small leaves. Some species are shrubby, others herbaceous. Its inflorescence is inconspicuous. It is a plant which seems to hold a title of preemption which others dare not gainsay.

So far I have failed to say much concerning its "boon companion." But wherever you find the sage brush you are also certain to find a clump of cacti of the genus *Opuntia* and sometimes many others of different genera.

The *Opuntias*, commonly called prickly pears, are always interesting especially when a close acquaintance is made unexpectedly. These attempts at friendship soon teach the animals that roam the prairies that any undue curiosity or familiarity is not desired. These prairie denizens soon understand and give a tract of land containing the cacti a wide berth.

The species of this genus are many and are characterized by very succulent and much branched stems shaped not unlike a pear in outline. These stems are used for storing up of the moisture thus differing from the sage brush which uses its roots for that purpose. These stems are so protected that the moisture is given little chance to evaporate. The innumerable spines and prickles scattered over the surface and the tough, thick and impervious skin incasing the stems arrest the dessicating power of the sun.

So succulent are the stems that they are in great demand by gazing animals and would be heartily eaten were it not for the little forts of tireless watchers whose reminders are not readily forgotten. Various methods are adapted for removing these prickles after which the plant makes an excellent and opportune food for sheep and cattle in seasons of prolonged drouth. Man too sometimes has recourse to them to quench

his thirst: the round species being cut open and drained of the almost pure water it contains.

One perhaps has oftentimes wondered where the leaves of the cacti are. What are known botanically as stems are usually known as leaves by most people. However, one can readily see the difference if he examines these organs and notices that they all branch and that the flowers spring from them. These characters which are never true of leaves will readily convince him of the fallacy of calling them leaves. The leaves are modified for the necessary function of protection and hence we have a remarkable example of degenerate leaves in the spines of the cactus. These modifications have made the cactus an ideal desert plant.

Cacti have other economic value from that as food for grazing animals. The fibers are used by certain tribes of Indians for making baskets. The spines of some species are used for toothpicks. The fruit of the *Opuntia* is often eaten some say with relish. The taste is rather pleasant at first but a little more than half one "apple," as the fruit is called, will generally suffice for persons not used to it, the taste being a sickening sweet one. In Oklahoma and elsewhere the Indians are said to make a meal of them.

The flowers of all the various species if they could be collected in one garden would form a rare conservatory of beauty unequaled by the efforts of any florist anywhere.

Last of all the cactus should be of special interest to us when we know that it is peculiarly a plant of the New World. Europe knew it not and Asia never saw it before the time of Columbus. It is unheard of amid the isles of the Pacific. Its home is in the Western Hemisphere and there it grows luxuriantly and in many varied forms counting upwards some eight hundred species.

The name, cacti, given to this group of plants by Linnaeus, was perhaps borrowed by him from the Greeks. These people used the word as the name for a plant which was somewhat spiny.

Evans, Colo.

NOTE AND COMMENT.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

BIRDS AS BOTANISTS.—Apropos of the interesting note on Birds as Botanists in your February issue, I noticed last spring in a cactus clump on the Mojave Desert a bird's nest prettily interwoven with the blossoms and stems of a small yellow flowered annual of the desert, *Baeria gracilis*. I do not know the bird that used the nest, but it was a small sparrow-like species—certainly not a bird of prey. The cactus, by the way, is a favorite building site for the desert birds, the sharp spines making an excellent defense for them against snakes and egg-eating animals.—*C. F. Saunders, Pasadena, Cal.*

XEROPHYLLUM ASPHODELOIDES.—That is a formidable name, yet the only common one of which we have any knowledge is not much better, being "turkey's beard." More than all the common name has no significance nor appropriateness whatever. The small flowers are borne in a dense raceme at the top of a stalk and are pure white, the only tinge of color about them being a hint of yellow given by the small but bright yellow anthers. Every year when this plant comes into bloom, we feel that it ought to be brought into more prominent notice. It grows in low moist land in shady places. It can be cultivated by imitating nature as nearly as possible. The plant may be easily recognized, its leaves are long and narrow, all starting from the ground, and look very much like those of the old Northern corn lily, (*Hemerocallis fulva*). The flower

stalk starts from the center and reaches a height of from eighteen inches to three or more feet. The flowers are borne in a dense cluster, at the top, from three to six inches long.—*Florida Agriculturist.*

EDIBLE FERNS.—I have never eaten a bracken, but in the Province of New Brunswick, Canada, have found the early shoots of ostrich fern (*Onoclea struthiopteris*), employed as would be asparagus with us. It is quite as delicious, if not more so.—*W. Whitman Bailey, Providence, R. I.* [Several other ferns appear to be edible. The young "fiddle-heads" of the cinnamon fern (*Osmunda cinnamomea*) are often eaten and the rare floating fern (*Ceratopteris thalictroides*) is reported to be used as a pot-herb by the natives in tropical lands. It grows in several places in the United States but usually goes into the herbarium instead of the pot when found. The bracken (*Pteris aquilina*), dried and pressed into cakes, is said to be a regular article of commerce in Japan.—ED.]

TWINNED PISTILS IN PARTRIDGE PEA.—In the late autumn of 1905 while on a botanical excursion with a party of students I found that on a specimen of partridge pea (*Cassia Chamaecrista*) one of the flowers had twinned pods. This hint suggested looking for more, and on our next excursion we carefully examined the plants in a dense growth of this species which we passed through, with the results that we found many twinned pods, and several cases where the pods were in threes. In most cases we found them only after the petals and sepals had fallen, but in several flowers the two pistils were found while the flower leaves were still present. The occurrence of more than one pistil in flowers of certain leguminous genera is well known to botanists, but I venture to say that probably few readers of the AMERICAN BOTANIST are aware that by a little close searching they may be seen in this common plant.—*Prof. Charles E. Bessey, Lincoln, Neb.*

THE PISTACHIO NUT.—The pistachio nut, an account of which was given in the last number is derived from *Pistachio Vera*, one of the *Anacardiaceae*.—W. W. B.

PUBESCENCE OF PLANTS.—I was interested in a note appearing in the February number of this magazine on the protective covering of plants. Here in the vicinity of Los Angeles there are comparatively few plants entirely free from pubescence, the percentage of "protected" plants among the five largest families being about as follows: Compositae, 77%; Cruciferae, 73%; Leguminosae, 70%; Scrophulariaceae, 69%; and Umbelliferae, 28%. The very marked difference between the Compositae and Umbelliferae can evidently be explained by the fact that 64% of the latter grow in damp places while all but 29% of the Compositae ordinarily grow in dry soil. Many of them also bloom during the dry season and in this case the pubescence is usually very dense and often the plant is glandular viscid.—W. Scott Lewis, Garvanza, California.

PELORIA.—In the March number of this magazine J. B. Turner of Hamilton, Ontario, tells of a curious form of toad-flax he discovered while out with a botanical class. It was that peculiar teratological condition of *Linaria vulgaris*, known to botanists as "peloria," and, I think first noticed and named by Linnaeus in this particular plant. At that time and for long after, it was regarded as a mere curiosity; now it is viewed as a key to interpret the ancestral form of *Linaria*. In the old times before us we now believe that *Linaria* was a regular and symmetric flower, with 5 spurs, 5 divisions of the calyx and 5 good stamens. Perfect peloria—a reversion to the old type—exhibits all these requirements. But we found as Mr. Turner did; two or three spurs only. The irregularity of our modern plant, which as in most similar gamopetalous corollas is accompanied by a suppression of one or more stamens, was no doubt the result of insect visitation. Observation has shown

that peloria occurs, as a rule, only in the upper flower of the raceme, where there is full chance to expand on every side.

I once had a funny experience with this condition. I had long known of the phenomenon, as it is mentioned and figured in various text books, for instance in Le Maount and Decaisne, but I had never seen it in nature. One day, walking alone on a street in the residence portion of Providence, I saw, in an open, unoccupied lot, a large bed of common toad-flax. With a bit of prescience I said to myself, " 'Tis now or never, I'll look for peloria." To my astonishment, I found nearly every plant, a dozen or more, in full peloria, and from that day to this, over twenty years, I've never seen it again. The phenomenon here described occurs in our native *Linaria Canadensis*; in the fox-glove, (*Digitalis purpurea*) and in other figworts. The whole matter is fully discussed and illustrated in Maxwell T. Master's "Vegetable Teratology," pp. 219 to 239 inclusive; also in the Gray's Structural Botany, Vol. I, page 186 and footnote.—*W. Whitman Bailey, Brown University, Providence, R. I.*

THE DIRECTION TAKEN BY ROOTS.—The roots of plants exhibit many evidences of intelligence that seem entirely out of keeping with their structure and position. The first or tap root invariably starts by the shortest route, straight downward while the secondary roots, as if aware of the plant food in the upper layers of the soil, spread out at right angles to the tap-root. The tap-root, however, will alter its course when its interests prompt, and should there be moisture to the right or left and none below, it will at once turn toward the moisture. The very ability to perceive this difference or to turn at all, would be astonishing if it were not so common. It is of immense advantage to the plant, for without it, the first obstacle met with in the soil would stop further growth of each root. Not all parts of the root possess this ability to turn, but only the parts a short distance back of the root tip. Another illustration of

roots that know how to adapt themselves to circumstances and to the plants' advantage is found in the ceriman (*Monstera deliciosa*) cultivated specimens of which are frequent in conservatories. This climbing arum produces two types of roots. One set grows out from the stem, like the roots of poison ivy and fastens the vine to its support; the other depends straight downward and finally enters the soil and secures more food for the plant. The latter roots often reach a length of more than fifty feet before reaching the earth.

RAPID GROWTH OF PLANTS.—Sometimes, after a warm spring rain, plants spring up with such rapidity that it is not uncommon to hear it said of them that one can almost see them grow. In high schools and colleges, too, by means of an auxanometer one can almost see plants grow and if he cannot absolutely see the motion, he can in a very short while, by consulting the scale, perceive that growth has actually taken place. This is as near as one can easily get in our latitude to seeing plants grow but in some tropical plants it is not very difficult to actually see stems elongate. The bamboo has been known to grow fifty-seven centimeters or nealy twenty-three inches in a single day or at the average rate of a quarter of an inch in a quarter of an hour. Since plants do not grow at a uniform rate throughout the whole day, but have certain maxima in which most of the growing is done, the elongation of the stem at certain hours is doubtless much more than a quarter of an inch in fifteen minutes, a rate that can actually be perceived.

SCARLET FLOWERS AND DROUTH.—It is sometimes said that plants with scarlet flowers stand drought better than others. The British *Gardening World* mentions this and says that there are but two scarlet flowers native to England, the poppy and the scarlet pimpernel, both of which grow best in dry and sunny spots. It will not do, however, to reach a conclusion in such a matter without more facts. The two plants with the

most vivid scarlet flowers in Eastern America, are the cardinal flower (*Lobelia cardinalis*) and the bee balm (*Monarda didyma*). The first when wild is almost invariably found on the banks of river or pond rooting in the mud, and the other is fond of wet spots in meadow and pasture. The painted-cup (*Castillia*) too, is fond of wet meadows. On the other hand, the red or fire lily (*Lilium Philadelphicum*) grows in dry upland woods far from moisture of any kind. Our only red cinquefoil (*Comarum palustre*) is found in deep bogs and so the list runs. Apparently the color in America, at least, is not to be correlated with lack of moisture in the soil.

CAULIFLORY.—In temperate regions the flowers are so uniformly borne on the young wood that we come to think of them as restricted to such places and it is something of a surprise to find in tropical countries many plants whose flowers and fruits are borne on the trunk instead of the small branches. The cocoa plant from which our cocoa and chocolate come, has this habit and a grove in full fruit looks like a peach orchard with melon-like pods hanging from the trunk and larger branches. Although a tree with its trunk in full bloom is an odd sight to botanists of the temperate zone, the occurrence is not at all mysterious or contrary to plant habits when we come to examine it. As we have stated, the flowers, with us, are borne either on young stems of the year, or on wood that was formed the previous year. The grape is an example of the first and the cherry of the second. In tropical trees that do not require a thick bark to protect the stem, there is no reason why flowers should not occur on the trunk and they are very often found there. They are supposed to be produced by dormant buds and are often restricted to the main stem only. In temperate regions, however, we are not entirely devoid of trees which show a tendency to cauliflory, as the phenomenon is called, for the red-bud (*Cercis Canadensis*) commonly has flowers from branches more than two years old.

EDITORIAL

Most lovers of flowers have heard of the remarkable collection of glass flowers at Harvard University, but many doubtless think as the editor did that they have been greatly over-praised. A visit to the collection, however, will at once dispel this notion. We expected to see some glass models somewhat resembling the living plants, but were quite unprepared for the marvelous exactness of the specimens. It is not an exaggeration to say that if living plants were laid beside the glass specimens, the real could not be distinguished from the artificial at a distance of a dozen feet. Minute parts such as stamens, styles and hairs, are quite as correctly reproduced as larger ones and the coloring is beyond criticism in most cases. While it is granted that the collection is not of use from the systematic standpoint, we are of the opinion that the flower-lover will find few more interesting objects in Boston and vicinity. The collection now numbers nearly six hundred specimens.

* * *

We probably know more about the first flowers to bloom in New England than of any other section. New England winters are proverbially bleak and the first flowers are therefore all the more welcome, when they do appear, besides there are more botanists in New England to write about their flowers than there are in other sections. But every section has some botanist, though the flowers are not alike, and these botanists are represented among the readers of the *BOTANIST*. It would be interesting to know what flower is first in each locality and thus we invite each of our readers to send us, on a postal card, an account of their earliest flowers. In the editor's region the first flower is certainly not the trailing arbutus for it does not grow there. Possibly the harbinger-of-spring (*Erigenia*) would be entitled to the award, though *Draba*

Caroliniana is not far behind. Of course the South, West and Northwest have still different species. Can we not have a symposium in some future number of this magazine with regard to the first flowers? Which flower is first? When does it bloom? What is it like? Where does it grow? Is it gathered for bouquets? Has it any other uses? What flower competes with it for first place? What enables it to bloom so early? Has it a store of food? If so, where? The cultivated flowers should be rigorously excluded. Such a symposium would be of much value and we trust our readers will find time to contribute their own observations.

* * *

Through the kindness of Prof. J. Y. Bergen, author of numerous botanical texts, we explored Concord, Massachusetts, last summer, under exceptionally pleasant circumstances. With the crowds of other visitors, we viewed the historic spots about town, including the graves of its famous men, but we were quite as much interested in the original Concord grape-vine, which still climbs over the dwelling of the late Ephraim Bull, its discoverer. Some weeks later, as we stood on the shores of Keuka Lake, and observed the vineyards rising, tier upon tier, from the waters' edge to the hill-tops, and called to mind the vast numbers of these vines stretching away across western New York, northern Ohio and Indiana, not to speak of the countless numbers in other regions, we reflected that this obscure man had possibly done quite as much for the world as his more famous townsmen. Another treat at Concord, was a look at Thoreau's herbarium and some of his manuscripts which with other relics of local interest are preserved in the excellent public library. The herbarium is in good condition and the plants are labelled in Thoreau's handwriting. The covers bear evidences that they were manufactured at home.

BOOKS AND WRITERS.

The appearance of Bergen and Davis' "Laboratory and Field Manual of Botany" calls attention anew to the excellent series of botanical text books of which it is a part. In the opinion of the reviewer the Bergen texts as they are frequently called, are the very best and most practical books for use in high schools that can be found. The present manual is a laboratory guide for use in connection with Bergen and Davis' "Principles of Botany" issued last year. Both books are designed to cover a year's work and of course follow the modern sequence which begins with the seed and runs through the structure of flowering plants in the first half year and mainly discusses the spore-plants in the second. Very little adverse criticism can be made of the "Principles of Botany." Its treatment of the subject is up to date and it is the only one of the Bergen books that is strictly a text and not partly a laboratory guide. Ecology is treated as a separate branch of botany but in the judgment of the reviewer should be blended with structure, physiology, etc., in a work like this. The new "Laboratory Manual" may appear to many to attempt too much. It is at once a book for use in a half-year or a year's course in the high school and a manual for normal schools and colleges. Such a volume may be confusing to any class without an unusually efficient teacher skilled in the selection of material. The experiments are for the most part illustrative and easily performed but there are several that require longer periods of time for results than seems desirable. In one the student is directed to watch his experiment for a month. It is doubtful if the interest of a high school class in any experiment can be sustained for thirty days. While the fullness of the book will detract in a measure from its usefulness in the high school, it will render it doubly valuable to all teachers. In addition to directions for the study of the entire subject attention is given to culture methods, botanical microtechnique, collection of material, etc. All in all it is a book that few teachers of botany will care to be without.



INNOCENCE.—*Collinsia Verna.*

THE AMERICAN BOTANIST

VOL. XII.

JOLIET, ILL., MAY, 1907.

No. 4

COLLINSIA Verna.

BY WILLARD N. CLUTE.

HERE are certain flowers in every locality whose bloom makes so profound an impression upon the season as to eclipse and put into the back-ground all others that chance to open their flowers at the same time. Sometimes it is the whole country-side that is placed under the spell, again it is only the bits of boggy meadow, the thickets or even the roadsides. Some of the flowers of which this is true readily come to mind as daisies, goldenrod, dandelions, buttercups, bluets and lupines. Most of these, however, become cheap and common by reason of a too lavish display of bloom, but this charge can never be honestly brought against the beautiful subject of this sketch which among the children goes by the names of wild for-get-me-not innocence, and blue-eyed Mary and to scientists is known as *Collinsia verna*.

Without having visited Japan we dare say that our woodlands are as well worth a visit at Collinsia season as any oriental wood is when the cherry flowers are unfolding. That we do not make holiday to see this rare sight is a matter of race not of comparative beauty. While the Collinsia is in bloom it is literally true that one cannot enter its favorite haunts without treading on flowers. It is spread as thickly through the woodlands as ever bluets were in a meadow and the two-colored blossoms nodding and swaying in the dappled shade of bush and tree make a sight not soon forgotten.

The flowers are among the oddest of blossoms. They

are two-lipped and at first sight appear to have but four petals each, although the plant is a member of the figwort family where five petals is the rule. Nor does there appear to be either stamens or pistils in the flower until upon further investigation we find the missing petal forming a sac beneath the lower lip and entirely concealing the stamens and pistil. This curious arrangement is an adaptation for cross-pollination and reminds one of similar contrivances in the peas, beans and their allies. That it is successful is shown by the great number of seeds the plant is able to ripen. Another singular feature in the sharp contrast in color between the upper and lower lip. The two upper petals are pure white and the two lower deep blue. Although but four petals are visible it has a very violet-like appearance. The flowers encircle the stem in several successive whorls of about five each and form what someone has characterized as a "many storied flower cluster." The lower circles bloom first and the blooming impulse slowly mounts to the top. There are several other species in the West, but all seem to agree in having bi-colored flowers. Toward the East our common species barely reaches western New York, which botanizers in New England may well regret.

The usual habitat of the plant is in moist woods and not in open meadows as some writers of popular botany, having confused this with the bluet on account of a similarity of common names, would have us believe. Nor are the upper petals blue and the lower ones white as one prominent guide to the wild-flowers asserts. We who know the *Collinsia* strongly suspect this particular guide to have written up the plant from the Manual and not from specimens. The fanciful nature of blue-eyed Mary is often given in books, but innocence is much better and even this, in common parlance gives way to wild forget-me-not at least in my own region.

LIANES.

BY DR. W. W. BAILEY.

THE Spaniards have a melodious word to designate a peculiar type of plant which reaches its highest development in the tropics, though not unknown elsewhere. The beautiful name *Liane* is applied to the trailing plants of quite diverse families, which, in equatorial forests swing from tree to tree reminding one, according to their size, of the cables or cordage of shipping.

As a rule these free-growing plants are not parasites, that is, they do not prey upon the other trees or shrubs to which they are attached. The true Liane is not even a climber in the botanical significance of that word. It has no tendrils or prehensile stems or roots of any kind, but, in its effort to lift itself out of the struggle below into light and air, it trails over other plants, or mats itself about them. Thus, while, in a sense, fragile itself, it makes stouter plants support it. Indeed, we sometimes find a mass of lianes completely replacing a tree, which it originally merely embraced. Its Laocoön-like clasp, becoming tighter and tighter, and its dense foliage interfering with the natural display of the tree's own vegetation, causes the latter's ultimate enfeeblement and death. These false trees, representing others of an utterly different nature that have entirely disappeared, often exhibit superb masses of verdure.

Says Kerner Von Marilaun, the great Vienna botanist, whose word-pictures are among the most graphic of any natural history writer:

"Often it happens that the name of a plant affects our imagination by its pleasing or harmonious sound. One associates with the name not merely the idea of the form of a certain plant, but more than this, its whole surrounding in which it grows and flourishes. One conjures up a picture

of a flowery meadow or scented wood with which the plant with pleasing name can harmonize. It may be some far back reminiscence is bound up with the pretty name, or we have read a vivid description in a book long ago. Thus idealized, one shrinks from approaching it with critical eye, from examining it with knife and microscope, and from classifying and describing it in the dry language of the specialist. I am thinking here specially of the word 'Liane.'" He then proceeds to describe in his own inimitable manner, a scene in an equatorial forest where lianes are a prominent feature.

In such a dense tropical forest, where constant rainfall alternating with powerful sunlight makes vegetation thrive to an extent unknown to us, plants in indescribable confusion are piled up, interwoven and twisted. The enormous trees rise like pillars, while between them swing living ropes, or are stretched bridges of verdure. These lianes are at times so interlaced as to make forest or jungle impenetrable. Green draperies, carpets and curtains, often ablaze with flowers, are the rule, but in tropical woods it is noticed that the blossoming occurs well aloft, and it is there that the gorgeous butterflies and moths, and the transcendent humming-birds, like living gems fly from flower to flower. Here, too, such creatures are more imitative of plants or of each other, than they generally are with us. One may choose an exquisite butterfly, and be almost upon it, when it disappears, and the hunter sees but a dry leaf. If he is led to watch the leaf, suddenly it is again an insect.

A passing breeze sets the lianes swaying and forming swings or hammocks for Ariel or Titania. "In other places they stretch in luxuriant festoons from bough to bough and from tree to tree * * * * there are even actual arcades with pointed and rounded arches. Isolated tree-trunks are transformed into emerald pillars by the crossing of woven lianes, or more frequently become the center of green pyramids over

the summits of which, the crown spreads out in verdant plumes."

The stems themselves are curious objects, twisted like the strands of a cable, coiling like a cork-screw, plaited or flattened like ribbons, pitted or formed into elegant steps, the so-called monkey-ladders. Nor do those frisky athletes neglect them as they scamper about the trees in wild play, using, in American forests only, their prehensile tail as a fifth and most important hand.

Among the massed lianes, is the place to look for aerial orchids, most marvelous of all flowers in form and color. Here too, ferns love to find their "coign of vantage" where, as Bunyan says, the "air is delicate."

Kerner regrets that "the sweet word liane" has not found its way into botanical language, and, practically it has. It originated, he says in the French Antilles, but has never found its way into most languages. We have seen that it refers to a type, not to any definite family or association of plants. In this view we find some of our own temperate plants falling under the head of lianes, as the very pretty Roxbury wax-work, some jessamines, barberries, and roses. In the tropics, the Bignoniacs or plants of the trumpet Creeper family are very typical lianes; so also are certain pipe-vines. These may form huge, stranded cables. Thin cross-sections of small twigs of those, display under the microscope most exquisite patterns and designs. Certain aroids, plants of the Calla family produce long trailing roots, as we know does also the banyan, but these are not lianes. To be such the stem must trail with an upward habit. Such roses as the now familiar crimson rambler, might be called lianes, while our Virginia Creeper, growing by an attachment to a support would not.

Providence, R. I.

AN AFTERNOON IN THE HELDERBERGS.

BY FRANK DOBBIN.

LEAVING Albany shortly after noon, a half hour's ride by train brought us to a small station within walking distance of the range of hills known as the Helderbergs. These hills have given their name to two geologic periods and because of their peculiar formations and the fossils contained in their rocks, they are of special interest to the geologist. However it was not as geologists but as lovers of out-of-door life and students of botany that we essayed their exploration on that March afternoon.

Tramping leisurely upward through the woods which cover the ascent to the cliff, rising eighty to one hundred feet to the level ground above, we made a casual examination of the lichen and moss flora. Here we found the lichen *Biatora verualis* but little else of special interest. We made our way slowly upward by the side of a mountain torrent which issues from Sutphen's cavern. At the cavern we found on a rock in the bed of the stream that somewhat rare lichen *Placodium elegans*. The stream at this time of the year almost completely fills the mouth of the cave, thus effectually shutting off further exploration in that direction. The cavern is said to have been explored for a distance of two and a half miles.

After a short rest we attempted the last hundred feet of the climb which is by a narrow path up the face of the cliff. Just then the path was filled by the remains of the winter's drifts through which we were obliged to stamp a path, one step at a time. Reaching the top at last through a narrow crack, which might aptly be termed "fat man's misery," I was surprised to find cultivated fields to the very verge of the precipice; some of them containing fine orchards of pear and apple trees. Indeed this whole region seems to be well adapted to fruit growing.

About a mile from where we reached the top we found growing on the edge of the precipice the moss *Hylocomnium (Hypnum) rugosum*. This spot is one of the few known stations for this rare moss in the state. The bear berry, *Arctostaphylos Uva-Ursi*, grows here in abundance, forming dense mats on the brow of the cliffs. Other mosses found were *Anomodon viticulosus*, *Raphidostegium cylindrocarpum*, and *Thuidium abietinum*.

After lingering for a while to gaze at the beautiful waterfalls formed by the melting snows in the fields above the cliffs we slowly took our way downward by a different path than that by which we had ascended. Here I collected my first wall rue, *Asplenium Ruta-muraria*, and was surprised and pleased to learn that this was a new station for eastern New York.

Many fossils are to be found about the cliffs, mostly certain crinoids and fossil shells of *Pentamerus galeatus*, more or less perfect. We recalled our half-forgotten geology enough to recognize some of them and others were carried away to be farther studied with the aid of a text book.

A downward plunge of several hundred feet was made by hanging on to bushes which grew beside what might by courtesy be called a path. However it was a short cut and saved us two miles of hard walking. Twilight found us hurrying to the little station to catch a later train to the city, well pleased with our afternoon tramp in the Helderbergs.

Shushan, N. Y.

OUR BIRD'S NEST FUNGI.

IT is probable that most lovers of out-doors have seen at one time or another various species of our bird's-nest fungi. They are not uncommon on the earth or on old logs and look like little cups or vases, less than an inch high-filled with small roundish balls. These cups are known as the peridia

of the fungus and the small balls are peridioles. The likeness of the two to a nest with eggs has given the common name to the group.

In our species each peridiole is attached to the peridium by a slender cord or funiculus which when wet becomes very elastic. The peridioles are filled with microscopic spores and these latter furnish characters by which mycologists distinguish the plants. They are not difficult to distinguish from one another, and we condense the following account of our four common species from the December number of "Mycological Notes."

Crucibulum vulgare is usually found on sticks, chips, etc. The cups are subcylindrical in shape and less tapering than in other members of this group. The color when young is yellowish and this is the only species of this color. When old the cups bleach out. In young specimens, the mouths of the peridia are covered with a thin yellowish membrane called the epiphragm. The peridioles are white and this is the only one of the bird's-nest fungi that has white eggs.

Cyathus striatus is usually found on sticks but sometimes on the ground, in the latter case attached to buried sticks. While *Crucibulum vulgare* has more of a "domestic" nature, being found often around houses, on chips in the wood-yard, on board walks, etc., *Cyathus striatus* has more of a wild nature and is generally found in the woods on brush-heaps, etc. It can always be known by the striations or lines on the inside of the cups. *Cyathus striatus* is the only species in the United States or Europe that has these marks. The color of the cups is dark brown or black and the European plant is darker than the American. The latter is sometimes known as the variety *Schweinitzii*. The peridioles of *C. striatus* only fill the lower part of the cup below the striations. They have a thin whitish surrounding membrane or tunica, but the eggs would be called black. *C. striatus* is easily recognized by its striations.

Cyathus vernicosus is the only species likely to be found growing in unmanured ground. Sometimes it is attached to buried sticks, but it rarely if ever grows on wood as the other species do. Like *C. striatus* it is of a wild nature, being found usually on bare ground in fields, borders of woods and similar places. It is readily known by the cups which are thicker, firmer, more flaring, smooth inside and smoother outside than the other species. The eggs or peridioles are black though covered with a thin white membrane and are much larger than any other species known.

Cyathus stercoreus is a manure loving species and is usually found in manured ground such as lawns, gardens, fields, etc. The cups are even inside and with shaggy hairs outside. When old they become smoother and are sometimes mistaken for *C. vernicosus*. When once learned, however, the plants can readily be distinguished by the cups. The peridioles have no membrane whatever, hence they are blacker than any other species. They are about twice as large as those of *C. vernicosus*. The first three species are usually abundant both in Europe and the United States but *C. stercoreus* while common in the United States is very rare in Europe.

AERENCHYMA.—One of the least known of plant tissues is that which goes by the name of aerenchyma. As its name indicates it is an aerating system being composed of large thin-walled cells with large intercellular spaces. It is comparable to cork but unlike cork the cells contain no deposit of suberin. Aerenchyma is usually if not always confined to water plants. Sometimes it is found only at the lenticels, but at others it forms a thick covering on submerged stems entirely replacing the bark. Probably no plant in our flora better illustrates aerenchyma than the water willow or swamp loosestrife (*Decodon verticillatus*). In this plant it is often an inch in thickness.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

CROTON TINCTORUM.—A little known and interesting industry of the south of France is the culture of great quantities of this little cottony, ash-white stiff-stemmed annual, the dried plants of which are shipped by boat-loads to Holland. The Dutch extract from the leaves and fruits the red dye with which their ball-shaped cheeses are colored. This croton has nothing in common with our ornamental greenhouse crotos.
—*Gardening World.*

VITALITY OF SEEDS.—The opinion is pretty general that some seeds may retain their vitality for centuries. Botanists usually scout the idea that seeds that have lain so long dormant will grow, but they are not always able to refute the statements that plants have been raised from such seeds. Occasionally a newspaper yarn whose verisimilude is such that the general public readily believes it, will recount the raising of corn from seeds found buried with a mound-builder, or the growth of wheat found entombed with an Egyptian mummy, but in cases where plants have apparently been produced from such seeds it is usual to find that the claim in which the seeds were found had been "salted." Maize or Indian corn was unknown to the Egyptians, and when a gullible American is able to raise maize from seeds found with a mummy in Egypt the circumstantial evidence is pretty strong that he has been

fooled. On the other hand botanists have not been wanting who believed that seeds occasionally germinate after long periods of time. *Gardening World* quotes Dr. Lindley the well known British botanist as follows: "I have at this moment three plants of raspberries raised from seeds taken from the stomach of a man whose skeleton was found 30 feet below the surface of the earth at the bottom of a barrow which was opened near Dorchester (England). He had been buried with some coins of the emperor Hadrian and it is therefore probable that the seeds were 1,600 or 1,700 years old."

A YELLOW TRILLIUM.—Yesterday while on an excursion to the woods with my class we came across a *Trillium* of a shade of color which I had never seen before and which it would appear has never been seen before by any one in this part of the country. The inner three leaves of the perianth were wholly a pure sulphur yellow, the outer leaves of the perianth were pale green below but as bright a yellow above as the inner part of the perianth. The other parts were normal in color and size. The flower was a newly opened one and grew amongst a larger number of specimens of *Trillium grandiflorum*. The peculiarity of color struck me as being so unusual that I want to inquire if any of the readers of THE AMERICAN BOTANIST have come across a similar freak in color.—R. S. Hamilton, Galt, Ontario, Canada. [The new botany is vitally concerned with these curious plants which systematic botanists are too often inclined to dismiss as mere freaks. The editor of this magazine is gradually assembling a living collection of these and will welcome additions of anything unusual. Botanizers who come upon any of these "freaks" are urged to remove them to their gardens for further observation. In cases where the plant is difficult to remove, seeds from the aberrant plant will usually produce the same form. Starting with one of these strange departures from the

normal, and continuing to encourage its peculiarities, it is quite possible to breed up a pure strain very different from the original. In these sudden changes of color, leaf form, shape of petal, or doubling of parts, we see one of the mutations of which present day evolutionists make so much. At some future date, the editor hopes to give an account of some of these oddities in his own collection.—ED.]

SEED STALK OF BLACK ACACIA.—Nature does some things with such exactness that we must always marvel at them. One may be justified in saying that nature can count for she



rarely makes a mistake in the proper number of parts to the flower, whether it be five-parted, three-parted or composed of some other number. She always hangs out the same kind of flowers in exactly the same way and practically never gets pansies or sweet-peas upside down. A further instance of this exactness may be seen in the seed stalk or funiculus of the black acacia of California to which our attention has been directed by Dr. W. W. Munson.

Our thanks are also due to him for the material for the accompanying illustration. In this acacia the seed stalk is unusually long and makes two nearly complete folds about the seed. One might think that with so many seeds to look after, nature might be excused for an occasional slip but such slips practically never occur. Each seed stalk upon leaving the seed passes half-way around it, then doubles back on itself and goes around the seed until it nearly meets the first turn after which it again bends back and is attached to the pod. The length of the seed-stalk itself, is remarkable. There are few genera of plants that can match it in this respect. The magnolia family has something similar, but here the seed stalk is more delicate and is coiled or folded within the pulp that encloses the seed.

ANTS AND SEED-DISPERSAL.—We seldom think of insects as distributors of seeds of plants. In the arrangements for pollination insects hold first place, but the plants usually bid for larger assistants, such as mammals and birds when their seeds are to be scattered. There are very many adaptations in the fruits of plants that make the conclusion irresistible that they were intended to entice animals to distribute the seeds. Few if any modifications which would cause seeds to be distributed by ants have been noted though some are inclined to think the caruncle of seeds like the bloodroot is an adaptation to make them easy for the ants to grasp. It is well known, however, that ants are great gatherers of seeds. The most of these are carried off and eaten, but probably as great a proportion are dropped and forgotten as of the hickory nuts carried off by the squirrels. Among the seeds that ants are most fond of may be mentioned shepherd's purse, chickweed, fumitory, nettle, snap-dragon, flax, cress, pigweed and various grasses.

HELIOTROPISM OF THE WATER FERN.—The curious fact that the water fern (*Marsilia*) like the clover and oxalis, closes its leaves at night, has long been known, but Robert F. Griggs has recently noted what appears to be a new motion of the leaves to enable them to face the sun. Thus far the habit has been noticed in but one species, *M. vestita*, but it is likely that other species may be found to act in the same way. According to the writer quoted, the leaves at evening squarely face the west, while shortly after sunrise they will be found to face the east. The movement seem to be produced by the petiolules of the individual leaflets, rather than by the petiole of the leaf. The motion which causes the closing of the leaves at night is also located in the petiolules. One striking difference between the night position of marsilia and oxalis leaves is that in the former the leaflets are erect and in the latter the

leaflets droop. The explanation for this seems to be a physiological one. In the oxalis the stomata, or openings through the epidermis, are mostly on the under surface, and the drooping position of the leaflets protects them through the night. The stomata of marsilia, on the other hand, are mostly on the upper surface, and the leaflets naturally bring their upper surfaces together in the night position.—*Fern Bulletin*.

PLANT DISTRIBUTION.—It is often a narrow line that prevents some cultivated plants from becoming weeds. If petunia, tomatoes, pumpkins and other food-plants of tropical origin could survive our winters we might soon find it necessary to hoe them out of spots in the garden where they were not wanted. These plants, however, cannot usually get through our winter even in the seed. An illustration of what might happen if they could is found in an insignificant Mexican weed, *Galinsoga parviflora*, that has slowly invaded the United States. The mature plants cannot endure our winters, but the seeds can and as a consequence the plant is steadily increasing its territory. Doubtless there are other plants of this character, the jewel-weeds (*Impatiens*) for instance.

POLLINATION IN EVENING PRIMROSE.—It will probably take several generations of botanist gardeners to correctly interpret even half of the peculiarities possessed by plants. Darwin's theory of evolution by slow gradations made it necessary to account for every thorn and prickle, every shape and turn of a leaf and all color, and as a consequence the literature of botany since Darwin's time has been full of explanations that in the light of our present knowledge do not explain. The thorns of the hawthorn do not appear to be necessary to the preservation of the species, nor does any significance appear to attach to the color of the juice of the poppy-worts. The foregoing has been suggested by an observation of De

Vries in his "Plant Breeding." The common evening primrose (*Oenothera biennis*) has an elaborate arrangement for cross-pollination, including odor, nectar, color and the ripening of stamen and stigma at different times as well as a difference in position of stamen and carpel, and yet De Vries finds in some specimens that the stamens pollinate the stigmas in the bud and the corollas may even fall off without expanding. All the odor, color, nectar, etc., of such flowers is superfluous and goes to waste. Just as we have figured out how the flower acts, it acts differently!

FRUIT AND TEMPERATURE.—It is usual to think of fruits in connection with the warmer part of the year, but it would be more correct to connect them with a cooler season. In fact, low temperatures favor fruiting. Although many of our fruits do not mature until summer or autumn they are nearly all begun, that is, the flowers nearly always appear, in the cold spring months. Our apples, peaches, cherries, plums, strawberries, currants, etc., all bloom so early in the year that they are likely to get nipped by a late frost. The crocus and other bulbous plants also refuse to send up their flower-spikes if kept in too high a temperature. When the apple tree is transplanted to warmer lands it may continue to grow, but it soon refuses to produce fruits because the temperature does not go low enough to induce blooming.

BRACKEN PROTECTED BY LAW.—In America the bracken (*Pteris aquilina*) receives scant attention from the land-owner, who probably never thinks of it unless he is devising a way of eradicating it from his fields. In England, however, the case is different, as indicated by the following communication recently published in *Gardening World*: "I have read with considerable surprise a letter in your issue to-day on the subject of utilizing the young shoots of bracken as food. Your cor-

respondent does not mention the locality in which she resides, which may differ materially from others, but here in Banstead, and for many miles around, the young bracken shoots are protected by very stringent laws, inflicting a heavy fine on any person cutting or mutilating the bracken before notice allowing them to do so is issued. This generally appears about the middle of September. The bracken is then dry and of a beautiful golden brown and then any person can cut any quantity he pleases." The usual fine is \$25.00 and costs. The correspondent does not indicate the uses to which the bracken is put, but it is probably used in packing vegetables and protecting tender plants outdoors, much as straw is used in America.—*Fern Bulletin.*

CHANGES IN NOMENCLATURE.—Those who are always ready to adopt the latest fad cannot understand why conservative botanists object to changing the names of plants. The fact is, however, that the names of plants cannot be changed without working much mischief to the literature of botany. The monumental works of Darwin, Kerner, Schimper and many others use what is now-a-days termed a conservative nomenclature. Books on medicine and pharmacognosy adopt the same nomenclature and even the drugs of the pharmacist are labeled in the same way. In a few years, if all the proposed changes are adopted, druggist, scientist, physician and student cannot understand these invaluable books without a glossary or a knowledge of the two styles of nomenclature. And upon what ground are we asked to adopt new names? Simply in order to conform to somebody's "system" or to honor some dead-and-gone botanist who failed of recognition in his own day. We shall continue to maintain that the name of a plant is of no significance beyond being a convenient and universally understood term to indicate it and the less it is changed, the better.

NEW RACES OF PLANTS.—It has been shown by Prof. G. Klebo of Germany, that remarkable metamorphoses can be produced in plants by artificial methods of cultivation. From several remarkable results obtained by him from experiments with *Veronica chamoedrys* and other plants he expresses the opinion that new races can arise as a result of changes in external conditions.—*Gardening World*.

EDIBLE FERNS.—Prominent amongst the grand display of ferns at the exhibition of the Royal Botanic Society of London on April 24th were specimens of the pithy cyathea (*C. medullaris*) a noble species from the Pacific Isles of a comparatively hardy character. This greenhouse evergreen tree-fern forms in its native country a common article of food with the natives. The roots and the lower parts of the stem are soft and pulpy and have a pleasant smell and taste, so that the medulla of this fern, which abounds in a reddish glutinous juice is nearly as good as sago. The silver tree fern (*C. dealbata*) a beautiful species from New Zealand is said to be eaten in the same way. *Alsophila excelsa* and *A. australis* are two magnificent umbrageous trees belonging to an allied genus. The middle of these trees from the root to the apex consists of a white substance resembling a yam and which tastes like turnip.—*Gardening World*.

THE DEFENSES OF THE CACTUS.—When we think of the means by which plants protect themselves from their enemies, the cactus at once comes to mind as a striking example. Although the regions in which cacti grow are veritable deserts for much of the year subjected to great heat and devoid of rain-fall, the plants themselves are usually thick and succulent, and would be toothsome morsels for the animals of the desert but for the terrible armor of thorns and spines with which nature has equipped them. Man is about the only ani-

mal that the cactus cannot repel with spines. When thirsty he is not averse to slicing off the top of the bisnaga (*Echinocactus Emoryi*) and obtaining a good drink of not unpalatable water. There are other cacti, however, with spines small or absent entirely and at first glance one is inclined to wonder why these have not long ago been devoured. Investigation shows that their immunity is due to the possession of bitter or poisonous juices. These latter species, then are even more successful than the spiny forms for they protect their juices from even the lord of creation himself.

DROUGHT AND COLD.—The physiological effects of drouth and cold are very similar. Drouth hastens the fall of the leaf just as cold does. Plants, such as pines, which do not cast off their leaves in winter, are often found both in cold and warm climates and in both they have the same needle-like leaves adapted to retard transpiration. A search for the cause of such adaptations in different climates reveals the fact that the southern pines dwell in soils that are physically dry, while the northern pines grow in soils that for part of the year are physiologically dry through cold. Plants are as likely to cast their leaves in a dry season in the tropics as they are at the approach of winter in the temperate zones.

ORIGIN OF FLORAL NUMBERS.—Take a straight vigorous twig of any alternate leaved plant and beginning at one of the lower nodes, pass a piece of twine from leaf to leaf up the stem. In all normal specimens it will be found that the leaves have a very definite position on the stem. The twine may pass one or more times around the stem before coming to a second leaf that is exactly over the one selected at the beginning, but in all cases, the leaves are arranged alike in the same species. In a large number of cases the twine goes round the stem twice and passes five leaves or buds before coming to

a leaf directly over the first. In others the twine goes around but once and the fourth leaf is over the first. Now looking down on the end of the stem or sighting along it, we see in the first instance that the leaves are arranged in five longitudinal rows, and in the second they are arranged in three. From the fact that five and three are numbers so characteristic of the parts of flowers, it is assumed that the flowers also correspond to the arrangement of the leaves, the principal difference being that the leaves are arranged in an ascending spiral, while the floral parts are in circles. Sometimes, however, as in the magnolia, even the floral parts are in spirals.

THE WAY WOODBINE CLIMBS.—The books are full of instances in which an error once made in print is repeated again and again by authors too indolent to examine for themselves. One of these relates to the Virginia creeper or woodbine (*Ampelopsis quinquefolia*). Several books examined recently aver that this vine climbs by means of adhesive disks on the end of its tendrils. Other books assert that the tendrils twine as do the tendrils of the grape. The writer of this paragraph contends, however, that both are wrong, for the woodbine not only has twining tendrils but it has adhesive disks as well. In some regions but one form is found; in others, both occur. The question then arises, shall we call each form an "elementary species" or are the two forms interchangeable? Not much is known about the distribution of the two forms and here is a case in which everybody who knows this common vine may be of use to science by recording the form or forms that grow in his own locality. But who can say, off-hand, which form is found in his locality? It is easy to see that even familiar species have many unknown points about them. It would be interesting to grow the two forms side by side for comparison. We expect to do this and hope to report conclusions later.

ORIGIN OF THE CUT-LEAVED SUMAC.—In extensive decorative plantings one may occasionally find a shrub that is evidently a sumac, but with leaves so fern-like as to make the plant quite unlike any native species. According to *Parks Floral Magazine*, however, this cut-leaved form is merely a sport from one of our common sumacs and was found some years ago growing wild in Chester County, Pa. It is said to be seedless but is easily propagated from root-cuttings. Now and then nature inspires some plant to put forth something new, and if the new form happens to be useful for decoration or for food, it may make a fortune for the discoverer. Several of the cultivated blackberries are simply especially luscious forms of the common wild species, and the well-known concord grape is also a sport of a native vine.

DANDELIONS AS Food.—As a nation we have not yet taken up the cultivation of the dandelion in earnest—possibly because it grows with us all too freely without cultivation—but this despised weed seems to be steadily gaining ground as an edible and in the Old World is frequently cultivated. In the markets of our larger cities the cultivated dandelion is often exposed for sale while in smaller towns the plants that grow so profusely in waste grounds are not disdained. Dandelion greens furnish many a healthful meal to the foreign part of our population every spring. But even in so apparently simple a matter as cooking dandelions there seems to be some tricks. The majority simply cut off the leaves, wash them and cook until tender. A better way is to select the large plants and after digging remove most of the green part of the leaves and all of the root except just enough to hold the leaves together. The lower part of the leaves are blanched from being in the ground and are sweet and tender. They should be washed thoroughly, parboiled for a few minutes and then cooked as usual. They may be served with mayonnaise

dressing or in any other way preferred. Such a dish is a great improvement upon the old fashioned dandelion greens. The time-honored custom of using a kitchen knife for digging the plants may be abandoned. A spade is much better.

MUSTARD AS A POT-HERB.—The entire cress family to which the mustards belong, have certain qualities that make them eminently fitted for the table. We have but to recall the fact that the water-cress, turnip, radish, cauliflower, kale, cabbage, brussels sprouts, horseradish and pepper-grass also belong to this family to realize how useful it is. Some species, however, have become troublesome weeds, for instance wild mustard or charlock (*Brassica sinapistrum*). An acquaintance of the editor's whose garden is badly infested with this weed has made a virtue of necessity by setting apart the worst corner of the garden for a mustard bed and regularly harvesting the crop which is cooked like any other pot-herb. There is an old saying that "one year's weed makes seven years seed" meaning that it takes seven years to get rid of the seedlings from one crop of weeds. This particular garden spot seems to have had several years weed to judge from the number of seedlings, but the owner counts this an advantage and looks for a supply of palatable greens for the entire summer. The charlock is especially harmful to grain fields in this country but if we should all begin eating it, it would doubtless soon be as difficult to raise and develop as many insect and fungous foes as any other inhabitant of the garden.

EDITORIAL

The fourth season of work in Nature-Study at the Connecticut State Chataqua begins July 12th at Plainville, Connecticut. The Nature Study is under the direction of the editor of this magazine and consists of a daily talk on out-door subjects followed by an excursion in wood and field. From a small beginning this department of the Chataqua has grown to be one of the most important, and those who would like one or two weeks outing in the woods with a company of people interested in birds, flowers, etc., are invited to investigate its merits. The expenses are low and the accommodations good. Those who wish further information may address The Connecticut Chataqua Association, 411 Windsor Ave., Hartford, Conn.

* * *

Before Bishop Vincent attained his present eminence he was for some time the minister in one of Joliet's churches. Recently at an anniversary of the church, the Bishop preached a sermon from which we cull the following extract. While not strictly botanical, it voices so nearly the things for which the journal stands that we are sure it is worthy of a wider audience:

"He is a wise man who resolves to live, whatever his occupation, in the widest sphere of life possible to him. Books give vision and vistas to men. Books make men travelers. Books turn ordinary men into scientists, philosophers and the companions of poets and sages. I pity little narrow limited shut in and shut up souls who toil and tramp and dicker and bargain, and eat and drink and sleep, and die, having neglected this packed and glorious universe of sights and sounds of science and splendor all about them—calling to them, beckon-

ing to them, trying to win their attention and allure them to accept their inheritance. I am specially discouraged over a class of Christian believers who are contented to live in comparative ignorance when they live in the center of all kinship. Music allures, science invites, art beckons, literature urges, religion pleads, astronomy flings out her radiant beams but they answer 'No, business calls me, my dinner bell rings, or I must sleep, let me alone.'

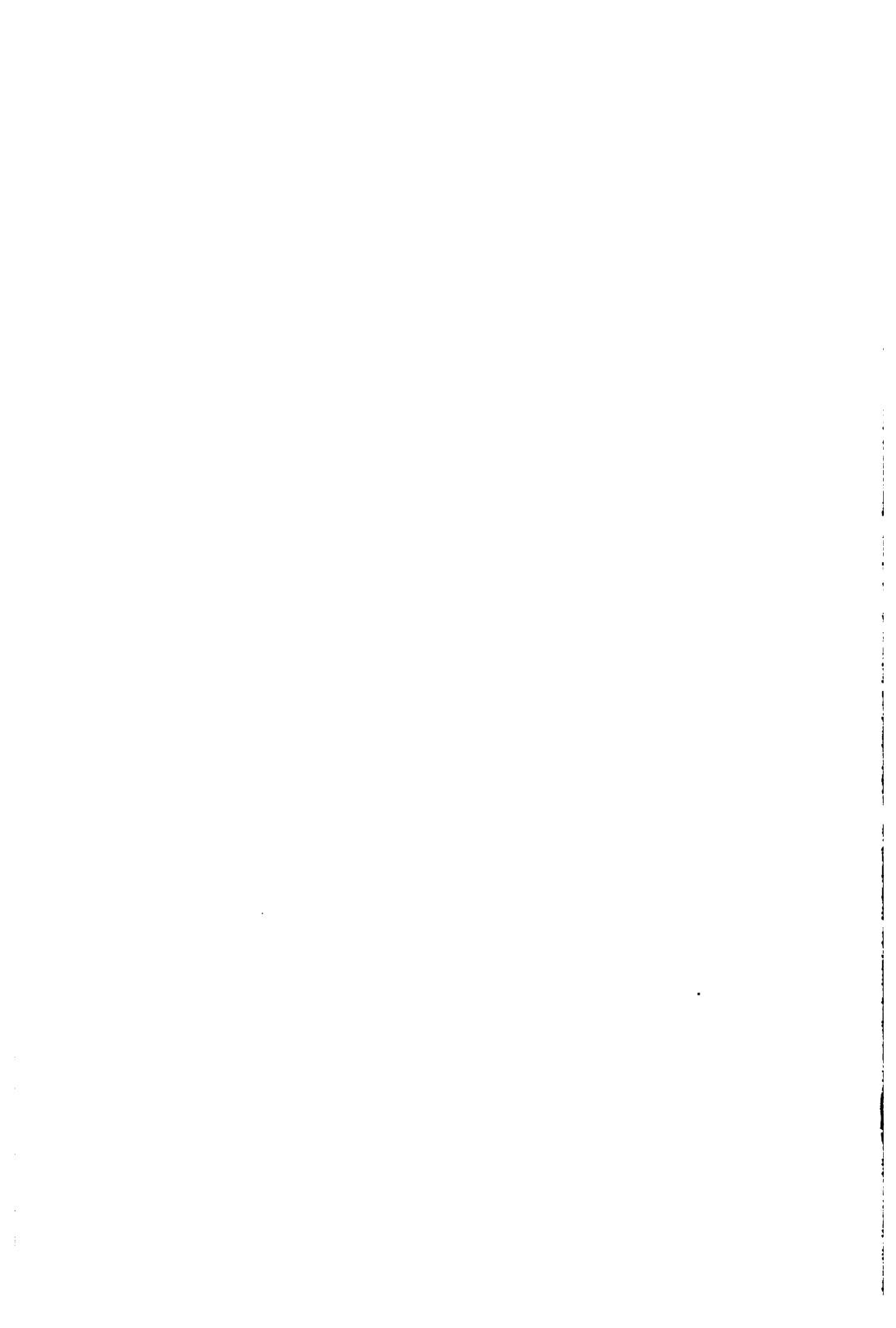
BOOKS AND WRITERS.

Several years ago, G. Frederick Schwarz, author of "Forest Trees and Forest Scenery" set about an investigation of one of the southern pines which forms much of the forest from North Carolina to Louisiana, and the results of his observations have recently appeared in the form of a small book on the "Long-leaf Pine in Virgin Forest" from the press of John Wiley & Sons, New York. The book will be a mine of information to foresters, lumbermen, and owners of southern timber-lands, and is not without its value to the ordinary botanizer who may recognize young specimens of this tree in among the Christmas decorations of the Northern States. Thus far, few trees have been considered of enough importance to merit an entire book devoted to them. The book includes twenty-three illustrations from photographs, and 127 pages of text. The price is \$1.25 net.

Every time a new gardening book appears it seems as if nobody would have the courage to write another because the field is already so well occupied. Two new candidates for the favor of gardeners have recently appeared, however, and apparently cover new ground. The two might be called companion volumes though written by different people and issue by different publishers. The first is French's "The Book of Vegetables" and the second Sedgwick's "The Garden Month by Month." The reviewer, who has a garden of his own,

has made almost constant use of the "Book of Vegetables" since it appeared. A more usable volume for the amateur would be hard to find. Practically everything grown in American gardens is given a place and as the subjects are arranged alphabetically any information one is looking for is soon forth coming. After a short general discussion of a plant there follows very definite information on soil, how and when to sow, thinning, transplanting, cultivating, fertilizing, harvesting, storing, plant diseases, etc., etc. The book is a well illustrated 12mo. running to 300 pages and is issued by the MacMillan Company at \$1.75 net. We wish somebody would make a similar book of annual flowers, and another of perennials.

The "Garden Month by Month" is a usable book of another kind. It is devoted to flowering plants, but is not so much interested in recommending special flowers for cultivation as in offering to the amateur information as to color, height and time of blooming of the hardy perennials. From this array it is expected that the gardener will be able to select his plants, as an artist selects his colors, and therewith paint his border and beds in any color or combination of colors desired. The flowers of every month from March to September are thus treated, all the flowers of each color being listed together, so that if one chooses to have a certain border blue or red in June for instance a very short reference to the book will give all the species available for the work together with their common and scientific names, height, and requirements as to shade and soil, their usual season of bloom, description of the flowers, how propagated, etc. The book is a fine specimen of the printers art, and contains more than 500 octavo pages and 150 superb illustrations. A color chart illustrating 63 named colors with which the colors of the flowers treated have been compared, makes possible an exact selection of flower colors. (New York, The F. A. Stokes Co., \$4.00 net.)





FORMS OF FUNGI.

THE AMERICAN BOTANIST

VOL. XII.

JOLIET, ILL., JUNE, 1907.

No. 5

WHY AND HOW TO BEGIN STUDY OF FUNGI.

BY STAFFORD C. EDWARDS.

NEARLY every one enjoys a walk in the fields and woods. If we ask ourselves concerning the pleasure thus derived, we would doubtless conclude that we are attracted by feeling the soft earth and leaves under our feet, by smelling the delightfully cool and fragrant air, by seeing the delicate plants just from nature's workshop, as yet unharmed by rude and vulgar contact, other plants perchance not seen by us before, and in other places great logs and stumps in the natural process of decay, untouched by the ravages of fire, a clean example of natural return to elements from which it was constructed. If we see a beautiful bird and hear some of nature's sweetest music, so much is added to the total recompense for the walk.

To those brought up in the noisy, dusty city, and unaccustomed to the "lonely" woods, the interest is but fleeting and shallow. To pick a few blossoms and leaves, soon to be thrown away, to throw stones at a few frogs and birds, and perhaps to climb a tree, these are the round of amusements afforded by the woods. To the one who has learned to "see" things when abroad, the ramble over hills and among the trees has quite a different meaning. If we are acquainted with ten plants we meet, if we know the names of the trees, if we notice several kinds of rocks, if we have seen among the birds some that we know, we have met so many old friends welcome and charming. We are still more delighted to meet a new friend if one concerning which we have heard or read presents himself among those already known. Any one who

has experienced these pleasures can readily understand why the naturalist does not need the company of his fellow man for long periods at a time to make his happiness.

A city bred person often does not contemplate with pleasure the prospect of a forced sojourn in the country. He does not know how to amuse himself. He does not have the advantage with the naturalist of meeting on every hand, so many of his friends. We can not all hope to become naturalists but the more of the out-of-door friends we claim as our own the greater pleasure is ours each time we go afield.

Probably many who are in the habit of taking strolls in the woods and meadows, and who derive much pleasure there in meeting known friends, have seen the plants of various form and color commonly called "toadstools." With this practical designation, the whole class has been passed by. I would that more know how easy it is to make these humble members our cherished friends though lowly they may be in the scale of plant life.

Exclusive of puffballs, the most common fungi met with in field and wood may be readily placed by the ordinary observer into one of four classes. By examining the underside of the fungus when found, it will be seen to possess either pores, very small, yet easily seen with the unaided eye, or gills, or spines or a smooth surface. Probably the greater part found will be of the first class. The fungus having pores may be shelving out from the side of a log or stump (fig. 1.) or it may have a central stem like the common mushroom (fig. 4) or again it may have a lateral stem as is in figure 7. The pore fungi constitutes a very large order, which order contains some of the fungi most commonly met. But for the beginner it should suffice simply to know the pore bearing from the others.

The fungi having gills to be the most commonly observed are the central stemmed ones (fig. 5) and one other variety of

the shelving kind (fig. 2). Then those will be found that seem to partake of both characteristics, gills and pores called daedaloid, meaning ornamental, the most common one growing on oak stumps and logs, having gill-like channels, the walls of which are connected by partitions at irregular intervals or so closely together that the surface resembles the first class in being porous.

The next class to be observed with ordinary frequency are those fungi whose spore bearing surface is smooth. Where pores or gills appeared in the former named classes the under surface is unbroken by channel or tube. The Stereums (meaning smooth) are mostly of the bracket type and closely resemble on the upper surface some of the common porous varieties.

The fourth great class of fungi to be mentioned here are those whose spore bearing surface is covered with spines or teeth. The Hydnoms (meaning spine bearing) may be found in nearly every shape, central stemmed (fig. 6) side stemmed (fig. 9) shelving (fig. 3) or in irregular masses.

After noting the above mentioned four types of spore bearing surface, the beginner can give attention to the appearance of the upper surface of the various forms of fungi. They may be smooth and papery, or minutely hairy or with a coarse, wooly covering, or again with fibrous scales. In color the dull browns, perhaps, predominate, but fungi may be found with almost any color—red, purple, yellow, green, white, or black. These colors may be evenly distributed over the surface or displayed in concentric or radial bands.

In texture, fungi may vary from the very hard woody ones, through various grades of tough leathery forms, to the fleshy and spongy varieties, even to jelly-like masses.

Fungi with stems may be easily separated into several classes by noting a few very plain features. In some the gills run part way down the stem, in others they may be notched

so as not to touch the stem at all. The stem may be fleshy or fibrous, solid or hollow, adorned with a ring around the top, or inserted in a cup at the base, or both the last named features may be present in the one specimen,—in which case beware!

Every one accustomed to the woods knows that fungi may be found almost anywhere, in the meadows, in old pastures, about old buildings, among shady bushes, in the deepest woodlands, on the ground and on wood in all stages of decay. It is a matter of equally common observation that fungi grow most abundantly during the cooler months, even into the depths of winter. On the fifteenth of January last I gathered a large pan full of the savory oyster mushrooms.

To those interested in fungi otherwise than from a botanical standpoint, the first question presenting itself is how to tell the ones good to eat. To answer the question by a simple rule for determining would immediately brand its author as an unreliable guide in the matter. The only rule I ever heard which seems to be thoroughly reliable is, "Eat them and if you live they are edible, and if you die they are poisonous." Since mushrooms are not a necessity, to the average person, the application of the above rule seems hardly practical. One should know mushrooms before attempting to eat them. Many varieties are good eating and truly a great delicacy, others are harmless and without flavor, while some few are extremely poisonous. If one is interested from the culinary standpoint, a little patient observation, together with study of a good book on the subject will give much of the desired information and incidentally reveal a new pleasure.

New Brighton, N. Y.

WAYSIDE FLOWERS.

BY DR. W. W. BAILEY.

A NY country may be known by its wayside flowers. The hedges and copses along the highways and paths of England show a peculiar flora. Those of Germany, France, Italy or Spain are again distinctive. Quite different are these as a rule from ours, although, as the home of the immigrant from all lands, one finds here a cosmopolitan collection. This is true, however, only near the cities; in the country American plants predominate.

British flowers have become a sacred part of English literature. From Chancer and the older bards, down to Mathew Arnold and Tennyson, the poets have revelled in them. Who does not know cowslips, oxlips, primroses, fox-gloves, cuckoo-pint and Canterbury-bells; daisy and dandelion, thyme, Marjoram and

“All the idle needs that grow
In life’s sustaining fields?”

Our own wild flowers too have been chronicled in sweet verse by Longfellow, Bryant, Lowell, Emerson, Thoreau, Whittier, and Holmes.

Of course the kind of flowers found by the highway will vary with the season. In June we notice the broad cymes of elder, like some rich and mellow point lace, creamy with age. Reflected in the still water it is very lovely. Wayside meadows are studded with Rudbeckias—“black-eyed Susans,” very splendid. Another field may be white with oxeyes, a billowy sea of foam. In low moist places one observes the dainty Pogonia, an orchid pink in hue and fragrant of violets. Do not mistake it for Arethusa, so like yet different. The latter is odorless and of deeper color; leafless too, while Pogonia has one leaf half-way of the stem. Calopogon, another orchid, is near it, peculiar for its erect crested lip. Usually it bears several magenta colored flowers. This is a tint esteemed by nature, and, as a rule, abhorred by man.

Here too, may be found the round leaved sun-dew, carnivorous in habit, a plant about which much has been written by Erasmus Darwin, his distinguished grandson, and other noted observers.

One notices in the fields tall and slender spikes of the blue lobelia, garnet gems of Deptford pink, and yellow stars of St. Johnswort. Nature is especially fond of yellow, and keeps something of that hue all summer. Thus in some sections the roadside will show in succession, coltsfoot, ragwort, St. Johnswort, yellow-topped chrysopsis, pretty little sensitive plants, autumn dandelions, and last of all, golden-rods. Thus is she lavish of her gold.

A very pretty and delicate wayside flower of midsummer is meadow beauty, *Rhexia*, with its peculiar funnel-like stamens, and four crimson petals. We may note, too, fine tufts of white meadow rue, groups of yellow, red, and orange lilies, slender blue iris, viburnums, cornels and button-ball.

Few people seem to know how many and varied are our clovers. Besides the fine old familiar dark red one, of forage fame, there is the little running white one, the lovely pink alsike, the Hungarian with its crimson pompon, and the two yellow hop clovers. Then, in dry districts rabbits-foot is common, with calyx teeth silken and feathery. It is a dainty little plant, like most of its kind adventive from Europe. Do not mistake the lucerne medick and alfalfa for clovers, nor yet the melilotis white and yellow. They are of close affiliation, but have pinnately compound instead of palmate leaves.

Surely any record of wayside flowers would be incomplete that omitted the wild roses, raspberries and brambles.

"Thy fruit full well the school-boy knows,
Wild bramble of the brake,
Then put thee forth thy small white rose,
I love it for his sake.

Though woodbines flaunt and roses glow
O'er all the fragrant bowers,
Thou needst not be ashamed to show
Thy satin-threaded flowers.

One can hardly speak of pond-lilies as wayside flowers, and yet, in a sense, they are so. Very refreshing it is to catch glimpses of their white, cool, odorous blossoms, anchored on some shaded pond, their leaves just tipping to the breeze to show their crimson lining. Among them grows yellow spatterdock, handsome in its place but coarse and mal-odorous.

It must be realized that our wayside flora will of necessity vary with locality. Along the sea beaches one will observe sea-lavender, jointed knotweed, rose hibiscus, yellow loosestrife, camphor-weed, maritine goldenrod and sea-side aster. Again, among the mountains will occur wild flowers not seen in the lowlands, mountain chickweed, dwarf azalea, Peck's geum and the like. Geology and geography both take a part in distribution as well as more subtle and accidental agencies.

Brown University, Providence, R. I.

THE PINE BARRENS OF NEW JERSEY.

THOSE who have gained their knowledge of the New Jersey "pine barrens" from a few weeks sojourn at Barnegat, Tom's River or other towns along the coast, supplemented by sundry glimpses from the car window as the train rushes along, may yet have but a faint idea of what the real pine barrens are like. To see them at their best—which in this case is also their worst—one must get further away from civilization than the railway will carry him. But before one leaves it, indications of what is to come are not wanting. The railroad dwindles from four tracks to two and finally one; the stations become smaller and draw further apart; and the vegetation steadily grows more dejected in appearance. At

the last change of cars—nobody can get into the heart of the “pines” without several such changes—one finds a train of two or three cars drawn by a wheezy engine which after some miles of jolting over uneven track finally comes to a standstill as if too tired and discouraged to go further. This is the end of the road and the few houses which constitute the last village are clustered about in a spot whose fertility, although slightly above that of the surrounding country, is still sufficient to make it a veritable oasis in this all but desert land. In all directions from its borders the gray sand extends, tenanted by stunted specimens of pitch pine whose stems are little more than poles, with a brush of yellow-green foliage at top which scarcely shades the small oaks and huckleberry bushes forming the principal underwood.

Upon entering the pines, one is impressed, not only by the paucity of species but also by the small number of individuals. The vegetation in many places is so scattering, that if the smooth level sand were solid, the bicycler might ride through the woods, choosing his own path, and meet with very few obstructions. With a wagon, one may drive about where he pleases. It is nevertheless the fashion to keep to the beaten path, even when a new one might promise better traveling. Once a road is broken, it is never wholly reclaimed by Nature, although travel on it may subsequently cease. One frequently comes upon such derelicts aimlessly sprawling across the country but apparently leading nowhere. It seems scarcely possible that the passing of an occasional wagon could keep the way open, but it is difficult for the plants to get a foothold in the dry soil, and the wind helps somewhat by blowing the sand about, so that the roadbed soon sinks below the surface, sometimes to the depth of a foot. In the yielding sand at the bottom the tires of the wagons are lost to sight. Three miles an hour is considered rapid traveling over such roads.

As much rain falls upon this part of New Jersey as upon any other, but the thirsty sand rapidly sucks up the moisture

and in a few short hours after a storm, the earth is dry again. These arid conditions have a very noticeable effect upon the few other species that here and there struggle with the pines and oaks for existence. For the most part they are heaths or heath-like plants with thick leathery leaves that are slow to let their scanty supply of moisture go. The wintergreen and trailing arbutus are common as is their near relative the bearberry. This latter is a prostrate shrub with small shining leaves and a profusion of red berries, very attractive to the sight, but containing a juiceless mealy pulp within. Apparently these berries once had juice, but the plant long ago gave up the idea of acquiring enough water in such a place to provide them with it. The cactus is the only green thing in the region that seems absolutely happy even in the driest weather. Its thick stems act as so many reservoirs storing up water during wet weather against a time of need and parting with it very grudgingly in dry times. This is probably the only plant that can produce juicy fruit no matter how dry the season. In June and July the plants are fairly full of the dark red "prickly pears."

It is sometimes difficult to understand how certain species of sand plants are able to exist at all until the underground portions are examined. It is then seen that the top is but an insignificant part of the whole plant, the thick roots often descending straight down for a distance of nearly six feet in their search for water. A notable exception to this is a species of "reindeer moss," a gray wiry lichen which forms little rounded knolls like pincushions on the bare sand. It lies loosely on the earth and appears not to be attached to it at all. At mid-day it is seemingly dead and the stiff branches crunch under foot, but as soon as the dew begins to fall! it revives and at once becomes moist, pliant, soft as velvet and full of life.

Desolate and barren as the pines ordinarily appear, the extreme is not reached until one has seen the tract of land

known as "the plains" lying due west from Tuckerton. They are seldom visited save by the berry picker or an occasional traveller taking a short cut to some distant village. If one can imagine a slightly undulating piece of ground, stretching away in all directions to the horizon and covered everywhere with diminutive pines and oaks, which, although not more than knee-high, bear their cones and acorns as plentifully as their more favored kin in better soil, he will have a fair idea of the region. The natives express its sterility by asserting that the only land tortoise ever captured in the locality was inquiring the way to the poor-house. In all this expanse, the tallest tree—a sassafras—is but fifteen feet high. To the botanist this section is of considerable interest since it contains several plants that are rarely found elsewhere. Among these may be mentioned the crow-berry, a low heathy plant which very few botanists have seen growing.

Among the most attractive spots in the barrens are the low places where the water comes to the surface. Here the sand vegetation suddenly gives way to cranberry bogs set thick with sundews, bladderworts and pitcher-plants all busily engaged in trapping insects. Or a greater depression may contain a cedar swamp whose tangled depths are the source of one of the amber-colored streams which leisurely wander away to join one of the numerous small rivers of south Jersey. As one emerges from the plains in the direction of Wading river, these bogs become very numerous, notwithstanding which, it is claimed that there is no malaria there and the natives drink from any running water with impunity.

The mosquito is everywhere in evidence, but by day these are not the greatest of the stinging, biting pests that inhabit the barrens. The crow-flies, black as night and as large as grass-hoppers, and several kinds of horse-flies which apparently consider man much better than a horse, are abundant and dwarf the mosquito's puny efforts into nothingness by com-

parison. When these bite, blood flows from the wound. Horses are rendered fairly frantic by their attacks. At sun-down these insects retire from the field, leaving the mosquitos much reinforced, in full possession.

The cranberry bogs are usually thickly fringed with huckleberry bushes. Upon these two crops nearly all who inhabit the barrens depend for an existence. During the few weeks that the berries are ripe everybody is employed and even at the small price obtained for the berries it is not uncommon for a good picker to make ten dollars in a day. While some of the berries are picked by hand and some by means of an instrument not unlike a coarse comb, the greater part are "scooped." The "scoop" is a basket-like affair with the top covered over as far as the handle on one side. The open side is swung against the tops of the bushes by the operator with such skill that few except ripe berries fall into the scoop. The berries are then winnowed by being slowly poured from one basket held a few feet above another while the wind blows through them, carrying away any leaves which have fallen with the berries. Host of the huckleberry pickers live in or near the barrens and daily journey to the best grounds in all sorts of picturesque conveyances. The outsider who visits the region for the huckleberry season may usually be found camping out in the most primitive style near some town along the railroad where he may readily turn his berries over to the agent of the commission man.

Later in the year, the cranberries afford employment, but since they are for the most part cultivated and only a small price is paid for picking, the pickers earn much less. There are, however, many places where the cranberries grow wild and may be had for the picking. The huckleberries are considered free everywhere.

The bogs again afford many plants to interest the botanist. The bog asphodel, an orchid-like plant with a spike of

lemon-yellow flowers is found nowhere else in the whole world and is valued accordingly by the plant collector. It is only occasionally found and seldom in great abundance. The curly grass is another plant worth more than passing notice from the fact that it is the smallest fern in eastern America. A fair sized plant roots and all, may be covered by laying a single finger upon it. Its leaves are like very slender blades of grass, coiled corkscrew-fashion and one must get down on hands and knees to find it. New Jersey is the only state in which it grows. These bogs are regarded as paradises by the botanist and in their season furnish a wealth of orchids and other rare plants not to mention commoner things which attract the plant lover.

If one consults a map of this region, he will find many places marked upon it which fail to materialize when search is made for them. It usually turns out that they are the sites of iron furnaces which were once employed in extracting iron from the bog ores. With the diminution of the ore supply the furnaces were gradually abandoned until all that now remains of many are crumbling walls and decaying timbers about the hollows where dwellings once stood. A few small hamlets have managed to exist after the fires in their furnaces died out, but the greater number are deep in decay, tenanted only by the lizard who delights to bask in the sunlight upon their fallen walls.—*New York Tribune*.

THE GREAT PRIMEVAL FOREST

THE great primeval forest, which is perhaps represented on a more impressive scale than anywhere else in South America, is the same that was described by the brothers Schomburgh in 1848 and 1850. We traveled up the middle course of the Essequibo river for seventy miles without finding a solitary clearing; not a single break in all the forest except where tributary streams flowed into our own. On both banks

of this chocolate-brown stream at a distance of seventy miles from its mouth, where the width of the stream is still from one to two miles or four or five times the normal width of the Mississippi river the great curtain of the primeval forest hangs virtually untouched by man. If I were asked to state briefly the distinguishing characteristics of this forest, I should find it difficult to frame a reply or to give to it proper perspective in comparison with the forest elsewhere. The great South American primeval forest is impressive; is imposing, but at the same time it is forbidding. With the great walls of vegetation rising to a height of 175 and 200 feet, with the crown of the forest carried at this enormous height above the spectators, and with innumerable creepers and trailers binding the whole into an almost impenetrable maze, the eye that is on the exterior has difficulty in finding points of rest or repose. But little sunlight penetrates into the recesses of the interior, and what there is of it comes out in scattered flecks of brilliantly reflected light and not as sunlight areas.

In its botanical relations the forest does not look particularly tropical, if by tropical we mean an aspect of vegetation which is dominated by types that one habitually associates with the lower climes and whose general physiognomy differs from the types of temperate regions. It is true that the eye fails to note the familiar forms of the oak, the maple, beech birch or poplar, but the general contour of tropical foliage, especially where it appears lost in mass, is not very different from that of these trees or of trees that in one form or another make up the bulk of the north woods. Except where clumps of palms stand out in particular relief, the trees of the South American forest have, apart from exceeding luxuriance and magnitude of dimensions, so nearly the characteristics of the foliage of the trees of our own region that the traveler could easily misinterpret the landscape of which they formed a part. Even where palms are present, they generally lose their crowns in the wall of vegetation that rises

above them and no longer appear as dominating or physiognomic types in the landscape; they are hardly more than sporadic components of the vegetation.

It is only when we penetrate into the interior of this great forest, when we study the individual elements that compose it, that we begin to be impressed with distinctive characteristics. One can truly say that almost every tree of the South American primeval forest is a botanical garden of its own. Rising up in supreme magnificence, the trunk hardly sending out a branch before it has attained a height of 125 or 150 feet, and completely overgrown with creeping and climbing plants, aroids and orchids, it is wholly different from the trees of the northern woods as it well can be. The tendency to spreading umbrella-like crowns differentiates the forest components of the south, as do also the giant buttressed roots which distinguish so many of the species.

Alfred Russell Wallace, who has enjoyed unusual advantages for the study of the general characteristics of tropical vegetation, has emphasized as one of the marked features of the tropical forest the absence of flowers. He says, indeed, that one may travel for weeks at a time along the streams of the Amazon region without once realizing those aspects of floral development which, whether by profusion of growth, or by size and color, impress the landscape of temperate regions. This picture does not seem to apply to the forest of the river-banks of the Guianas, and its inaccuracy has been pointed out by that acute student of nature, Mr. Inturn. The streamers of purple, red and white which hang down over the forest curtain easily recall in profusion and wealth of color the flowers of the north—the field daisy, clover, and buttercup. Indeed, it would be difficult to recall in forests of the north, even as rare instances, that display of flowers which so frequently repeats itself here.—*From an article by Prof. Angelo Hielprin in National Geographic Magazine.*

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

VERJUICE.—The civilized palate craves not only food, but various condiments which of themselves have little if any food value. Mixed with the food they give it a certain relish. Some of the well known condiments are pepper and other spices, vanilla, vinegar and red pepper. A condiment much prized in earlier times was called verjuice. This was made by expressing the juice from green apples, crab-apples, unripe grapes and other unripe fruit. Verjuice was intensely sour and used like vinegar or lemon juice is at present. It is said to still be used to a limited extent.

VIOLET HYBRIDS.—Dr. Ezra Brainerd has been growing some of the reputed species of blue violets from seed and the results have shown what all of us have felt morally sure of, namely, that many of the recently named species of blue violets are simply hybrids. Dr. Brainerd says that the seedlings of the pure violet species resemble one another very closely, but the hybrid offspring are not only unlike each other but often unlike their parents. In cases like the latter we would be inclined to inquire whether the reputed pure parent species were not themselves hybrids. At present, the genus *Viola* in the Eastern States is regarded by radical botanists as being composed of a considerable number of closely allied species that freely interbreed, but we ask, why are these radical bot-

anists so cock-sure that these are species, why not sub-species or forms? If we consider them forms they will serve just as well as an attachment for the name of a botanist and that is all any such fine distinctions are good for. When species of violets are split so fine that a violetologist cannot name his own species without looking at the labels it is nearly time to stop.

KNOWING BEANS.—The man who "doesn't know beans" is considered of not much account, but there is a great deal about this common vegetable that is not familiar to the average individual. We usually speak of beans as if there were but one edible species; in reality there are more than half a dozen commonly cultivated. The kidney bean (*Phaseolus vulgaris*) is the one with which we are most familiar, the common bush bean being of this type. The lima bean (*Phaseolus lunatus*) is also well known, especially in Southern gardens. The scarlet runner bean (*Phaseolus multiflorus*) is seldom used as a garden crop with us, but its bright red flowers and gaily colored pods make it sought to some extent for decorative planting. In Great Britain it is commonly cultivated and is there called runner bean. The root is perennial and may be kept over winter in the cellar. Another British favorite is the broad bean (*Vicia faba*) often called the horse bean and without doubt the species fed to his horse by the immortal Captain Jinks. The seed is not very bean-like and the plant itself looks more like a pea than a bean. It, too, is perennial and loves a cool summer. For this reason, many more are grown in Canada than in the United States. The soy or soja bean (*Glycine hispida*) is the bean of the Japanese. It is becoming common in cultivation in our own country, but as yet only as a food for cattle and hogs. The hyacinth bean (*Dolichos lablab*) is another bean used for decorative purposes that is edible. It produces very long pods and is in consequence called asparagus or yard-long beans. The velvet

or banana bean (*Mucuna utilis*) completes the list of our common beans. This latter is a native of the tropics and is likely to be redistricted to the warmer parts of America. It is used for a forage crop and for plowing under to enrich the soil.

HOREHOUND FOR THE MILLION.—One of the weeds that amount almost to a pest in Southern California is the common horehound (*Marrubium vulgare*) of the old fashioned herb garden. It is abundant wherever the ground is cultivated, and its matured seed-vessels cling by prickles to the wool of animals and to the clothing of pedestrians in the persistent fashion of the beggar's ticks and Spanish needles of the East. The average Eastern tourist with interest enough in plants to notice it at all, usually mistakes it for catnip, but curiously enough the latter herb seems never to have become wild here. At least, I have never seen it, nor do the local manuals list it.—*C. F. Saunders, Pasadena, California.*

BUTTER-CUPS AND DAISIES.—It would be hard for residents in some sections of the Eastern States to imagine a region in which the common butter-cup and daisies are rare or unknown but such a condition prevails in the editor's vicinity; indeed, at the present time, a thriving bunch of the plant which in other regions is the despised white weed or ox-eye daisy, is blooming among the other flowers in his garden. Now and then, one may find a tuft of this plant along the railroad like a tramp looking for fresh fields, but the flowers are as yet an absolute novelty to most people who have never made a visit to the east. As to butter-cups, while there are plenty of indigenous species *Ranunculus acris* so common in the east is decidedly a rare plant. In this connection it may be of interest to note that the black-eyed-Susan (*Rudbeckia hirta*) rarely if ever fills up single fields to the exclusion of everything else as it does in the east. Here it occurs scattered among other species that hold it within bounds.

NATURE'S EXACTNESS.—Your observations on Nature's exactness in the *Note and Comment* department of your May issue, reminds me of a little aster-like flower which I have collected on the desert, *Monoptilon bellidiforme*. Each flower-head is composed of perhaps 15 or 20 florets, each of which produces a single seed, and every spring tens of thousands of these little plants come into being, making myriads of seeds thus produced. The marvelous thing about them, however, is that on the upper edge of each of those myriad seed is borne one tiny bristle which drops with the seed. It is a case of degenerate pappus, and the wonder is that nature, busy as she is the world over, never forgets that solitary bristle for each of those little florets away out there among the coyotes and prairie dogs of the Mojave Desert.—C. F. Saunders, Pasadena, Cal.

NOMENCLATURE AGAIN.—It is not botanists, alone, that are bothered with the name-tinkers. In a recent number of *Science*, J. L. Kingsley writes that he has been looking for fixity in zoological names for thirty years and the end seems as far away as ever. We quote from his article as follows: "It is all very well to indulge in these antiquarian researches, these games of taxonomic logomachy, if they be recognized as such, but the players fail to recognize one thing: Names of animals and plants are but means for easy reference; nomenclature is not the end and object of all biological science. This digging up of forgotten screeds means but the relegating of the great masters of the past to a secondary position; this framing of ex post facto laws offers a precedent for the future subject of that intolerable disease once known as "mihi itch" to set aside as lightly the laborious schemes of the sciolists of today. Biologists may apparently be divided into two groups: one contains those who find great enjoyment in renaming things already well named and who regard names as the object of all science. The other group have something to

tell about animals and plants and they regard names merely as a means of identification of the forms referred to. The question once was, "who reads an American book?" If the present tendency continues it will soon be "who can read an American biological work?"

PENNSYLVANIA WILD FLOWERS.—About the middle of May a party of five crossed the Susquehanna River at Millersburg, Penn., intent on finding as many specimens as possible on which there were open flowers. Our territory covered that part of Perry County between the landing and Mt. Patrick. Directly after landing we discovered our old friend, common blue violet, (*V. cucullata*), and growing near were the white violet, (*V. blanda*), and yellow violet, (*V. pubescens*). Scattered among these was pale corydalis, (*Corydalis glanca*) and not far away cinquefoil, (*Potentilla Canadensis*) celandine, (*Chelidonium majus*) and wild cranesbill. (*Geranium maculatum*). Soon one of our number spied what seemed at a distance to be a white star-like flower but on coming nearer we found it to be dog's tooth violet (*Erythronium Dens-canis*) living within calling distance of its near relative yellow adder's tongue (*E. Americanum*). As none of us had ever before found the former, it was with difficulty that we left the patch in which grew millions of a plant that we had considered quite rare. Separated from this colony by a shallow stream, we discovered smooth lungwort, (*Mertensia Virginica*), wild blue phlox, (*Phlox divaricata*) and Dutchman's breeches (*Dicentra cucullaria*) growing in such profusion that we could but wish that the contributor to the AMERICAN BOTANIST, who lived where Dutchman's breeches would soon be a rare flower, might have enjoyed with us the splendid flowers and luxuriant foliage. Mingled with these we saw sweet cicely, (*Osmorrhiza longistylis*), crow's-foot, (*Dentaria laciniata*) and bitter-cress, (*Cardamine rhomboidea*). On the margin of a near-by field, long-leaved stitch wort, (*Stellaria*

longifolia), rock-cress, (*Arabis lyrata*), hedge mustard, (*Sisymbrium officinale*) and pepper-grass, (*Lepidium Virginicum*) had found an abiding place. We had now almost reached Mt. Patrick, a settlement which from a distance bears a strong resemblance to a Swiss village, and turning homeward by a different path we found spring beauties, (*Claytonia Virginica*) and ground ivy (*Nepeta Glechoma*) while in a neighboring woods were butter-weed (*Senecio vulgaris*) and Jack-in-the-pulpit (*Arisaema triphyllum*). A lonely columbine (*Aquilegia Canadensis*) and a bare half-dozen wood anemones (*Anemone nemorosa*), near which in a very sandy soil grew a few horse-tails ended our list and we, having completed our circle, boarded the steamer, feeling that the trip was worth all the fatigue it had caused us.—*Katharine P. Smith, Millersburg, Penn.*

EDIBLE FLOWERS.—The cauliflower and artichoke are by no means the only kinds of flowers that are used as food, though, from an edible point of view, Dr. Johnson was probably right when he said the former was "the finest flower of the garden." Cloves and capers are well known to professors of the culinary art and both consist of flowers, the former being the dried flowers of a pretty myrtaceous plant from the far east while capers come from the shores of the Mediterranean and other temperate climes and are made from the partly opened blossoms of a trailing bramble-like shrub. These are all well known edibles but there are many flowers used for eating in other countries that we only admire for their delicate beauty. The Chinaman, for instance, has a penchant for pork served with a sauce made from various members of the lily family, the flowers being first dried and powdered, while the ginger family, besides the root produces flowers that are much relished by native tribes in the Himalayas. In various parts of India and also in New Zealand the pollen of certain flowers is made into bread, while the little brown man from

Japan likes his chrysanthemum salad, made from the petals of his national flower. In England the taste seems to run to drinks, and just now the children are busy gathering cowslips to make cowslip wine. —*Gardening*.

FASCIATED DANDELIONS.—From Miss Mabel Dimock, Peekamose, N. Y., we have recently received excellent specimens of faciated dandelions. In these specimens there has apparently been a slip in the machinery of nature with the result of uniting what would ordinarily be two or more flower-heads into one. In some years these freaks are quite common and may be distinguished from the normal flower-heads at some distance by their unusual size. Fasciation has been reported in many other flowers, and De Vries, by cultivation has been able to produce a race of faciated plants from several including the dandelion. It is interesting to note that the coxcomb (*Celosia cristata*) often found in old fashioned gardens is a faciated plant that has almost replaced the normal form.

THE FARMER'S MENTAL EQUIPMENT.—It is believed by some dwellers in the city that the farmer lives on a farm because he hasn't brains enough to do anything else. The *Ashland Gazette* sizes the case up differently and says that a successful farmer must know considerable of several sciences. "He must have botany enough to enable him to understand the nature of his crops and how they grow; geology enough to know the different kinds of soil and their properties; entomology enough to know which insects are pests and which are friends; ornithology enough to know which of the birds are injurious and which are helpful; forestry enough to know how to properly reserve, extend and harvest his woodland; and horticulture enough to know how to manage his fruit and vegetable gardens." Ordinarily the farmer does not go in much for botany as such; in fact, he may imagine he has no

botany because he may not have taken this study up in school, yet the successful farmer is one of the best of practical botanists. He may not always understand the fundamentals of every operation requiring botanical knowledge but he knows what to do to produce effects. Long before the scientists ascertained why leguminous plants enriched the land, the farmer was familiar with the fact that clover plowed under added fertility to the soil.

RANGE OF *LYCHNIS ALBA*.—The white evening campion (*Lychnis alba*) is a weed so recently introduced that it failed to be noted in any but the most recent Manuals and the range is given as Ontario and the Middle and Eastern States. It is very evident that it has come to stay, however, for it is steadily increasing its territory. It has been known for some years from Joliet and no doubt may be found in the environs of Chicago. An account of this plant was published in volume I, of this magazine.

POLYEMBRYONY.—When we plant a seed we expect it to produce a single new plant, but instances are not rare, in which the seed contains more than one embryo and then we may get several plants from a single seed. Polyembryony as this condition is called is found in at least a dozen plant families and in thirty or more different species. As is well known, the single embryo found in ordinary seeds is produced by the fertilization of a single cell, the egg-cell, within the embryo-sac of the ovule. The extra embryos found in polyembryony arise in different ways, sometimes from other cells within the embryo sac, at others from cells just outside of it. In the June *Torreya* M. T. Cook records his experience with the seeds of the mango tree (*Mangifer Indica*) in which he found at times no less than eight embryos. The orange (*Citrus aurantium*) was the first plant in which polyembryony was found and it still remains one of the most frequent exhibitors

of this feature. Now that plant breeding is progressing on scientific lines, this polyembryony is likely to cause much bother to the horticulturist because usually only one of these embryos comes from the fertilized egg which results from careful pollination and when several seedlings spring from one seed, he is quite at a loss to know which is the hybrid and which are mere offspring from the plant pollinated.

HONEY GUIDES OF BURNING BUSH.—The burning bush (*Euonymus atropurpureus*) is an attractive object in the autumn woods when its pinkish seed-pods begin to open exposing the red-arillled seeds inside, but the flowers that produce these seed-pods are quite as interesting. They are rather small and dull dark red in color, suggesting at once the specific name of the plant. There are four petals, and the ovary is surrounded by a thick disk, such as may be seen in many maples and other near relatives. The chief interest centers in the stamens with bright yellow anthers which alternate with the corolla and are very noticeable against the back ground of dull red. Soon after the flower expands the anthers fall off leaving the short thick filaments, like little posts, in the flower. Since the filaments are also red, one can tell by a glance at the flower whether it is a fresh one or not and the contrasts in color may serve as an indication to visiting insects.

PEACH AND PLUM LEATHER.—Man has discovered a variety of ways for preserving fruits after their season is over. Some like the apple may be kept fresh by simply storing in cellars, others like the fig and prune are dried, still others like the olive are preserved in brine or, like the cucumber, in vinegar, while others are canned as are pears, cherries and the majority of our fruits. A variation of the drying process applied to peaches and plums consists in drying the crushed pulp of these fruits on a platter in an oven forming a fruit "leather." A few hours soaking makes the leather ready

for use. The Italians and other foreigners often preserve tomatoes, of which they are very fond, in the same way. This process is not far removed from that by which guava and cactus "dulce" is made in the tropics. In this connection the Turkish method of preserving grape juice may be mentioned. The juice is boiled down until it is about as thick as molasses and is then further thickened with starch or flour, and spread out in thin sheets to dry in the sun.

TREES INJURED.—Our chilly and prolonged spring has not seemed to affect our native trees, except the sycamores (*Platanus occidentalis*). All of these that I have seen in this section had their new leaves nipped, apparently by frost, just after they had begun to put them out—when the largest were about two or three inches broad and all that I have seen hereabouts are covered with the dead leaves. They have started a new set of leaves, but the young leaves are now only about as large as the first set was when nipped, presenting a marked contrast to the maples and other trees now in full leaf.—*Elwyn Waller, Morristown, N. J.* [It is just possible that the trees have been attacked by a fungus. In the vicinity of New York, many of the oriental plane trees (*Platanus orientalis*) are killed back each spring by this fungus.—*Ed.*.]

THE EARTH STARS.—According to Mr. C. G. Lloyd, who has pretty thoroughly searched this planet for specimens, there are but forty-six marked forms of the curious little earth-stars (*Geaster*) in existence though, as is usual in such matters, one hundred and twenty-seven names have been proposed for them. Mr. Lloyd thinks that seventeen of the forty-six forms are not worthy of specific rank, and what he thinks on this subject is nearly certain to be right for no man has seen more of these plants than he. If those who make "new species" of plants were required to see their plants growing before giving them a name, there would be fewer names to both-

er real students. It may almost be set down as an axiom that the maker of the most "new species" knows least about the plants in the field. One may even become so unacquainted with living plants as to be unable to recognize them. "Let us dry it and then see how it looks" said New England's most distinguished botanist when asked for the name of a plant that was not familiar to him.

SASSAFRAS.—I do not think I have seen it recorded that one seldom finds a sassafras tree 8 or 9 inches in diameter, of which the top has not been broken out by some high wind. The break is, of course, an inducement to rot and the broken top often shows rotten wood, but the original cause of the break appears to be due to inherent brittleness in the wood and not to weakening through rotting.—*Elwyn Waller, Morristown, N. J.*

GROWTH OF PERENNIALS.—Even from its seedling stage, the ordinary perennial is a plant of very deliberate ways. The annuals are the active individuals. They must be up and doing or cold, drouth, insects, other species or the gardener may forever prevent their accomplishing their life work. But the perennials, able to withstand the cold of winter, are in no hurry, apparently counting a firm root-hold in the soil and a small amount of stored food accomplishments enough for one growing season. One can almost tell whether a seedling is an annual or perennial by the rapidity with which it grows. The purslane (*Portulaca oleracea*) is one of the latest of weeds to appear each season, but no one ever saw the "pusley" crop short for lack of growth.

EDITORIAL

According to our custom, no numbers of this magazine will be issued for July and August. The number for September will be issued early so that when our subscribers return from their vacations they will find the first number of the new volume awaiting them. We trust that all our readers will have a pleasant summer and return from their outings with full note-books. We dare not expect that their pocket books will be in the same condition.

* * *

The botanically inclined often have occasion to observe the truth of the old couplet that

" 'Tis strange what difference there can be
'Twixt tweedledum and tweedledee."

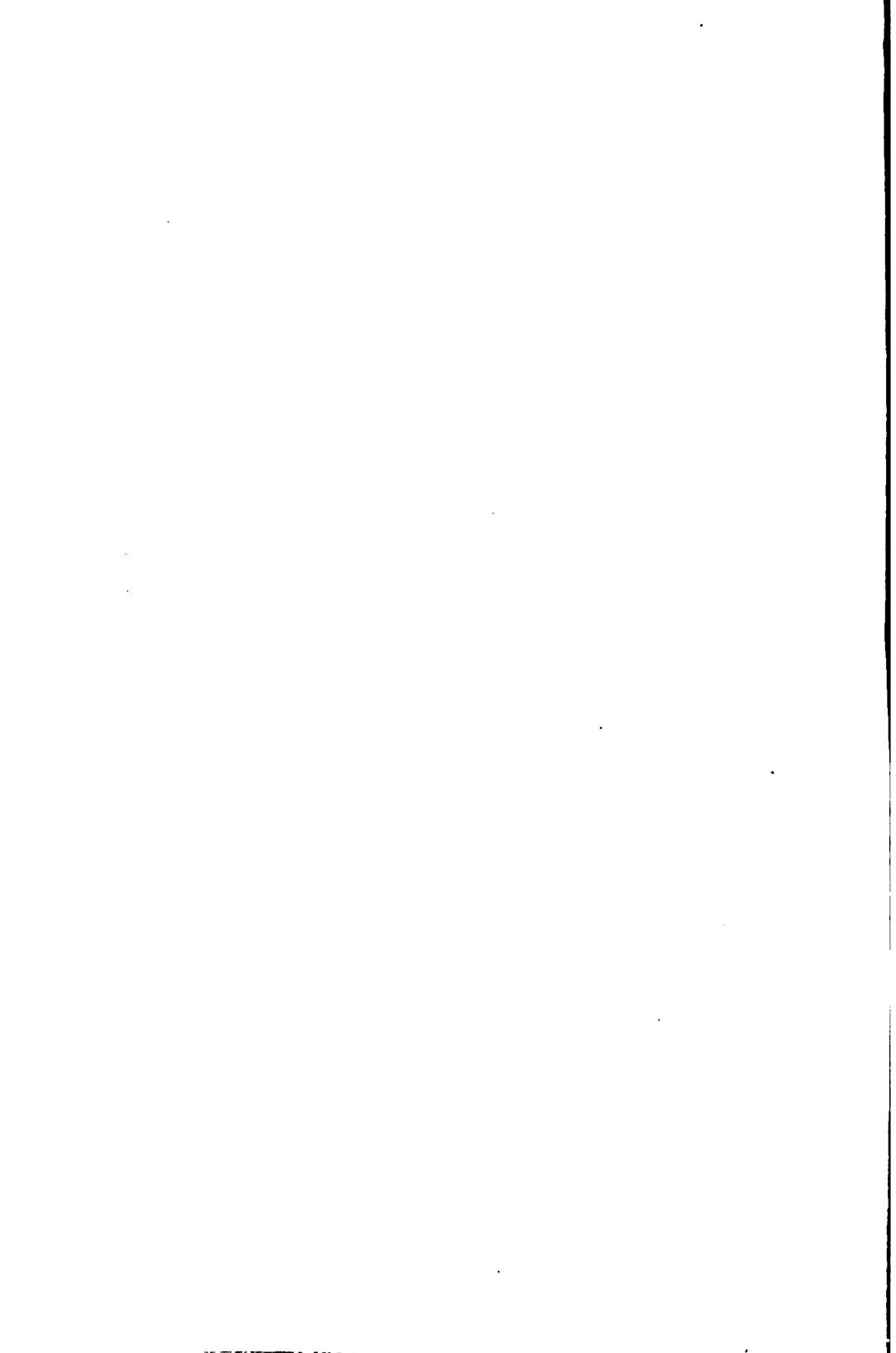
This is well shown in the mere identification, of plants. Take a plant in hand to a botanist for name and he will identify it, give you its family history and tell you what it is good for and consider your thanks adequate pay for the trouble. But take a plant in your throat to the physician and he will identify it as diphtheria, and charge you well for telling what is good for it, or rather what is good for you by being bad for it. Nobody thinks the physician should work for nothing; he has studied hard in order to identify just such frisky bacteria and other plants that make our anatomy the scene of various colonizations, and his money is well earned when he has aided our bodies to exterminate the would-be colonizers. But the botanist belongs to a different class. Though he studies as long as the physician he usually works for nothing. The great Linnaeus, himself, dubbed botany "the amiable science" and its votaries ever since have been an amiable lot of men and women who have done more work without reward than any

other group of scientists of like attainments anywhere. And the botanists, themselves, are usually so animated by a love of the subject that they do not complain. The contributors to the botanical magazines write without pay, the editors devote their time and talents without thought of compensation and the publishers half expect to find themselves in a financial hole at the end of the year. As a matter of fact, we cannot recall a single botanical magazine now published except THE AMERICAN BOTANIST that is not backed up by some society pledged to make good any deficit and usually called upon each year to do so. Since this magazine is not backed up by a botanical society, we find it necessary to make it pay its own way. We have practically said to it what nature has said to the flowers, namely, if you cannot survive without aid, you must perish. Thus far the magazine has survived and we expect it to go right on surviving, but at this time, when, a large number of subscriptions are due, we would call attention to the fact that an increased subscription list will mean a better, or rather a larger magazine. We see all the botanical magazines published in America, and we know there are none better if judged solely by the amount of information supplied. Of course there are many larger, but the technical articles, which interest only the few, take up much of the space. It is not the easiest thing in the world to find subscribers interested in our particular kind of botany. It requires a pretty thorough knowledge of plants in order to appreciate a great deal of the matter we publish, and the majority of botanizers are, unfortunately for us, interested in little more than the names of plants. It is a satisfaction to know, however, that once a subscriber is secured we rarely lose him and sooner or later he orders a set of the back numbers. So we purpose continuing our endeavor to please our present audience and to urge our friends to help us increase it. We send out bills with this issue to all whose subscriptions expire or have expired and

hope that all will renew. The magazine is sent until ordered discontinued in order to please most of our subscribers. If you no longer wish the magazine kindly notify us. In order to induce new subscribers we offer to send two copies of this magazine to different addresses for \$1.60. If you induce a friend to subscribe at \$1.00 you save forty cents on your own subscription, or you may divide the saving with him. Most of our readers have acquaintances who are also interested in botany. It would be easy to induce them to subscribe and thus double the subscription list. If this is done, we will double the size of the magazine without extra cost. We promise that the coming volumes will be as good as any that have appeared, and on these grounds invite all our subscribers to renew.

BOOKS AND WRITERS.

Most of the works on American botany have been written in the United States but Canada now come to the front with "Studies of Plant-Life in Canada" by Catherine Parr Trail, well known as an author of other volumes on Canadian subjects. The plants to receive attention in the present volume are practically identical with those growing in the woods and fields of the Northern States. No attempt has been made to include even all the showy flowers and the fact that it is not designed as a manual of the region is shown by the lack of a key of any kind. The text is entirely concerned with interesting bits of information about the conspicuous plants of the Canadian woods in which are interspersed many quotations from the poets. The grouping follows, in a measure, the sequence of the seasons. Twenty plates, some of which are in color, embellish the work. The book is an octavo of some 200 pages, and will be very useful in winning a wider regard for the wild-flowers of the region covered. (Toronto; Wm. Briggs, \$2.00 net.)



3 2044 103 100 897

